INTERNATIONAL
REGISTERED GRAPHICAL ITEM
CLASS: BIIF PROFILE

ISO/IEC
BIIF PROFILE
BPCGM01.00

Working Draft Version 1.0

- Information Technology -
- Computer Graphics and Image Processing -
- Registered Graphical Item -
- Class: BIIF Profile -

BIIF Profile for Computer Graphics Metafile
Working Draft Version 01.00
(BPCGM01.00)

02 June 2003

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Foreword

The International Standard 12087-5:1998, Basic Image Interchange Format (BIIF), provides guidance for creating profiles of BIIF. At this time, two profiles of BIIF have been established: 1) the model profile of BIIF as specified in ISO 12087-5; and 2) the NATO Secondary Imagery Format Version 01.00 (NSIF01.00). The NSIF01.00 profile of BIIF allows for the graphical annotation of image data using the provisions of ISO/IEC 8632, "Information Technology - Computer graphics - Metafile for the storage and retrieval of picture description information."

The following is submitted as a result of the North Atlantic Treaty Organization (NATO) Standardization Agreement (STANAG) 4545, promulgated by the Chairman, Military Agency for Standardization (MAS) under the authority vested in him by the NATO Military Committee.

BIIF Profile: BIIF Profile for Computer Graphics Metafile Version 01.00 (BPCGM01.00)

Although expressly developed for use with the NSIF01.00 Profile of BIIF, the BIIF Profile for CGM Version 01.00 is suitable for use within any profile of BIIF.

This standard is normative.

Informative Note: Historically, an International Standardized Profile (ISO/IEC 12071-1) was developed to provide profiles for the Computer Graphics Metafile (CGM ISO/IEC 8632:1992). At present, four profiles have been previously established as ISPs. They are: Basic Scientific and Technical Graphics (BST), Advanced Scientific and Technical Graphics (AST), Basic Presentation and Visualization (Model Profile), and Advanced Presentation and Visualization (APV).

The BPCGM01.00 is not a part of ISO/IEC 12071-1; it is being registered as a graphical item under the procedures of ISO/IEC 9973, "Computer graphics and image processing - Procedures for registration of graphical items."

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Introduction

The definition of the BPCGM01.00 Profile is within the context of the BIIF Profile class of graphical items in accordance with the principles and procedures specified in the ISO/IEC 9973, "Computer graphics and image processing -- Procedures for registration of graphical items," and Annex C of ISO/IEC 12087-5:1998, "Profiling BIIF."

The BPCGM01.00 Profile of CGM (ISO/IEC 8632) was cooperatively developed between the ISO and NATO communities.

The NSIF01.00 is a BIIF profile intended to promote interoperability for the exchange of Imagery among military Command, Control, Communications, and Intelligence (C3I) systems. The BPCGM01.00 is the profile for graphic annotation of digital imagery. STANAG 4545, (U.S.) MIL-STD-2500, and (U.S.) MIL-STD-2301A are specific user community documents used for implementing the NSIF01.00 BIIF Profile and the BPCGM01.00 Profile.

All compliant NSIF decoders are required to decode all variations of CGM graphic data within the limits of this profile. Compliant NSIF encoders that support CGM graphical annotations must only produce CGM graphical data that is compliant and within the limits of this profile.

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Information Technology
Computer Graphics and Image Processing
Registered Graphical Item, Class: BIIF Profile

BIIF Profile for Computer Graphics Metafile Version 01.00 (BPCGM01.00)

1 Scope

1.1 General

The Basic Image Interchange Format (BIIF) provides a file format that is suitable for the interchange, storage, and retrieval of map and imagery information. The file format consists of a file header and associated image(s), symbol(s), text and/or associated data in a way that is compatible between systems of different architectures and devices of differing capabilities and design. Symbols within a BIIF file may consist of ISO/IEC 8632-based Computer Graphics Metafiles (CGMs).

The CGM provides a metafile format suitable for the storage and retrieval of symbolic information. The CGM format consists of a set of elements that can be used to describe graphical and textual symbols in a way that is compatible between systems of different architectures and devices of differing capabilities and design.

This BPCGM01.00 profile defines a subset of CGM elements, sets limits for generation and interpretation behavior according to the rules for profile definition defined in ISO/IEC 8632. The BPCGM profile defines a version 1 CGM suitable for use in annotation of digital imagery such as that defined by BIIF ISO/IEC 12087-5: 1998.

1.2 Position within the Graphical Item Register

BPCGM01.00 is a profile for use with ISO/IEC 12087-5, BIIF, registered under the BIIF Profile class of graphical items in accordance with ISO/IEC 9973.

The graphical item registration information is as follows:

Graphical Item Class:	BIIF Profile
Graphical Item Long Name:	BIIF Profile of Computer Graphics Metafile Version 01.00
Graphical Item Short Name:	BPCGM01.00
Sponsoring Authority:	The United Kingdom sponsors this Profile through their membership in the ISO committee.

Preparing Authority: This document was prepared for the sponsoring authority by the NSIF (NATO STANAG 4545) Custodian; U.S.; Secretary of the Air Force, Information Dominance Directorate, Reconnaissance Systems Division (SAF/AQIJ).

1.3 User requirements and scenario

This part of ISO/IEC BPCGM01.00 provides a profile, BPCGM01.00, which has limited capability and is suited to the basic requirements for annotation of digital imagery such as that formatted according to BIIF ISO/IEC 12087-5.

2 References

2.1 Normative References:

The following documents contain provisions which, through reference in this text, constitute provisions of this Profile, BPCGM01.00. At the time of publication, the editions indicated were valid. All documents are subject to revision, and parties to agreements based on this profile are warned against automatically applying any more recent editions of the documents listed below, since the nature of references made by profiles to such documents is that they may be specific to a particular edition. Members of IEC and ISO maintain registers of currently valid International Standards and profiles.

Referenced Documents:	*Title*
ISO/IEC 8632:1992	Information technology - Computer graphics - Metafile for the storage and transfer of picture description information - Part 1: Functional Specification
ISO/IEC 8632:1992	Information technology - Computer graphics - Metafile for the storage and transfer of picture description information - Part 3: Binary Encoding
ISO/IEC 8632:1992/ Amd. 1: 1994	Information Technology - Computer graphics - Metafile for the storage and transfer of picture description information -, Part 1: Functional specification, Amendment 1 - Rules for profiles; Part 3: Binary Encoding, Amendment 1 - Rules for profiles
ISO/IEC 8632:1992/ Amd. 2: 1995	Information Technology - Computer graphics - Metafile for the storage and transfer of picture description information: - Part 1: Functional specification, Amendment 2: Application structuring extensions; Part 3: Binary Encoding, Amendment 2: Application structuring extensions
ISO/IEC 9973	Computer graphics and image processing -- Procedures for registration of graphical items
ISO/IEC 10646-1:1993/Amd.2:1996	Information technology - Universal Multiple-Octet Coded Character Set (UCS) - Part 1: Architecture and Basic Multilingual Plane - Amendment 2: UCS Transformation Format 8 (UTF-8)
ISO/IEC 12087-5	Information technology - Computer graphics and image processing - Image Processing and Interchange (IPI) - Functional specification - Part 5: Basic image interchange format (BIIF)
ISO/IEC BIIF PROFILE NSIF01.00	Information Technology - Computer Graphics and Image Processing - Registered Graphical Item, Class: BIIF Profile - NATO Secondary Imagery Format Version 01.00 (NSIF01.00)

Application for copies of ISO documents may be addressed to the respective national ISO representative.

2.2 Non-Normative References:

The following documents are referenced for information purposes only.

Related Documents:	*Title*
MIL-STD-2301A	Computer Graphics Metafile (CGM) Implementation Standard for the National Imagery Transmission Format Standard
MIL-STD-2500B	National Imagery Transmission Format Version 2.1 for the National Imagery Transmission Format Standard

Copies of the U.S. MIL-STDs are available from Standardization Document Order Desk, 700 Robbins Avenue, Building 4D Philadelphia, PA 19111-5094.

3 Definitions

For the purposes of this profile, the definitions given in ISO/IEC 8632 and ISO/IEC 12087-5 apply. The following definitions are provided for convenience in using this profile.

Attachment Level (ALVL). A way to associate images and graphics during movement, rotation, or display.

Character. 1. A letter, digit, or other symbol that is used as part of the organization, control, or representation of data. 2. One of the units of an alphabet. Note: For BPCGM, a character is defined by ISO/IEC 10646, 1-octet coded Universal Multiple-Octet Coded Character Set (UCS), Basic Latin.

Common Coordinate System (CCS). The virtual two-dimensional Cartesian-like coordinate space which shall be common for determining the placement and orientation of displayable data.

Foreground Colour. The Colour used in the rendering process in which primitives are rendered on the display surface, as opposed to the BACKGROUND COLOUR or AUXILLIARY COLOUR. The Foreground Colour is set separately for each class of primitive.

Graphic. Graphic data is used in the NSIF to store two-dimensional information represented as a Computer Graphics Metafile (CGM). Each Graphic Segment consists of a Graphic Subheader and a Data Field containing the graphic data. A graphic may be black and white, greyscale, or colour. Examples of graphics are circles, ellipses, rectangles, arrows, lines, triangles, logos, unit designators, object designators (ships, aircraft), text, special characters, or a combination thereof. A graphic is stored as a distinct unit in the NSIF File allowing it to be manipulated and displayed non-destructively relative to the images and other graphics in the NSIF File. This standard does not preclude the use of n-dimensional graphics when future standards are developed. Note that the term "Graphic" as used in this document and "Symbol" as used in BIIF have the same meaning.

Graphic Segment Overlays. Graphic segments are used to provide graphical (lines, polygons, ellipses, etc.) and textual annotation to the image segment(s). The graphic representation is done using CGM. In a manner similar to image segment overlays, the placement of graphics in the CCS plane is controlled by the value of each Segment's Attachment Level (ALVL) and Location (LOC) value. CGM has its own internal Cartesian coordinate space called Virtual Display Coordinates (VDC) that has its own defined origin (0,0) point. The row/column value in the graphic segment LOC field (SLOC field) identifies the placement of the graphic's VDC origin point relative to the CCS origin when ALVL is equal to 000, or relative to the SLOC to which it is attached.

Non-Destructive Overlays. NSIF image segment and graphic segment overlays are handled in a non-destructive manner. The overlays may be placed anywhere within the bounds of the CCS (defined for a specific NSIF File by the CLEVEL field). They may be placed totally on the image, partially on the image, or entirely off of the image. Any image segment or graphic segment can be placed on or under any other Segment, fully or partially. The visibility of pixel values of overlapping Segments is determined by the Display Level (DLVL) assigned to that Segment. Each displayable Segment (images and graphics) is assigned a DLVL (ranging from 001 to 999) that is unique within the NSIF File. At any CCS pixel location shared by more than one image or graphic, the visible pixel value is the one from the Segment having the greatest DLVL value. If the user of a NSIF File opts to move an overlay, or turn off the presentation of an overlay, the next greatest underlying pixel value(s) will then become visible. This approach allows for the non-destructible nature of NSIF overlays as opposed to the 'burned in' approach where overlay pixel values are used to replace pixels values of the underlying image.

Image. A two-dimensional rectangular array of pixels indexed by row and column.

Pixel. A pixel is represented by an n-vector of sample values, where n corresponds to the number of bands comprising the image.

Integer parameters. For BPCGM, all integer parameters are 16-bit two's complement signed integers except where specified. Each 16-bit word is numbered from most significant bit to least significant bit using 15 to zero (as illustrated on figure 1). When a 16-bit two's complement integer is used as a parameter in a CGM metafile, the high order byte of the integer is represented as the 8 most significant bits. That is, bits 15 through 8. Bits 7 through zero represent the low order byte of the integer. Note: This is also known as the "Big-Endian" or "Network Byte Order" representation for 16-bit integers.

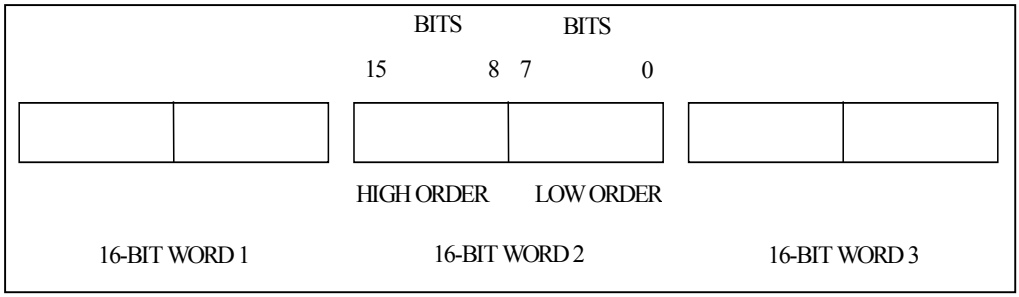

Figure 1. Integer parameters

Virtual Device Coordinates (VDC) space. The VDC space defines a coordinate system that is overlaid onto an image to which CGM elements are referenced.

4 Abbreviations

For the purposes of this profile, the abbreviations given in ISO/IEC 8632 and ISO/IEC 12087-5 apply. The following abbreviations are provided for convenience in using this profile.

ALVL	-	Attachment Level
APV	-	Advanced Presentation and Visualization
AST	-	Advanced Scientific and Technical Graphics
BPV	-	Basic Presentation and Visualization
BST	-	Basic Scientific and Technical Graphics
BIIF	-	Basic Image Interchange Format (ISO/IEC International Standard 12087-5)
BPCGM	-	Basic Image Interchange Format Profile for Computer Graphics Metafile
CCS	-	Common Coordinate System
CGM	-	Computer Graphics Metafile
DLVL	-	Display Level
IEC	-	International Electrotechnical Commission
ISO	-	International Organisation for Standardization
MAS	-	Military Agency for Standardization
MIL-STD	-	U.S. Military Standard
NATO	-	North Atlantic Treaty Organisation
NSIF	-	North Atlantic Treaty Organisation Secondary Imagery Format
SALVL	-	Symbol (Graphic) Display Level
SLOC	-	Symbol (Graphic) Location
STANAG	-	NATO Standardization Agreement
VDC	-	Virtual Display Coordinates

5 Conformance

Conformance of metafiles to ISO/IEC 8632 is defined in terms of conformance to profiles. A metafile conforms to ISO/IEC 8632 if it conforms to a profile. A metafile may conform to ISO/IEC 8632 if it conforms to the BPCGM01.00 profile.

All compliant NSIF decoders are required to decode all variations of CGM graphic data within the limits of this profile. Compliant NSIF encoders that support CGM graphical annotations must only produce CGM graphical data that is compliant and within the limits of this profile.

6 Profile Registration

This profile is registered under the provisions and procedures stated in Annex C of ISO/IEC 12087-5:1998 and through the ISO/IEC processes found in ISO/IEC 9973. Proforma tables from ISO/IEC 8632 and associated "Rules for profiles" were used to define the BPCGM01.00.

7 Specification of the BPCGM01.00 Profile

7.1 BPCGM01.00 Profile summary

The following is a summary of the features, capabilities, and constraints in the proforma tables contained within the BPCGM01.00. For more details, review the proforma tables to identify the allowable values for each field and supplemental tables for additional explanation.

7.1.1 CGM commands. The BPCGM implementation for NSIF is a subset of, and complies with the specifications established in, ISO/IEC 8632. The CGM structure is explained fully in the ISO/IEC 8632 document. The following describes the required CGM commands that the CGM implementation for NSIF must support for input interpretation and output generation. The CGM commands used in this subset are listed by element class. When CGM commands are encountered that are beyond the minimally compliant CGM implementation listed below, the interpreter is responsible for interpreting, discarding, or substituting for these commands.

a. Metafile Delimiter Elements
   BEGIN METAFILE
   BEGIN PICTURE
   BEGIN PICTURE BODY
   END PICTURE
   END METAFILE

b. Metafile Descriptor Elements
   METAFILE VERSION (version = 1)
   METAFILE ELEMENT LIST
   METAFILE DESCRIPTION
   FONT LIST

c. Metafile Picture Descriptor Elements

COLOUR SELECTION MODE (1 = direct)
EDGE WIDTH SPECIFICATION MODE (0 = absolute)
LINE WIDTH SPECIFICATION MODE (0 = absolute)
VDC EXTENT

d. Metafile Graphical Primitives with Associated Attributes
   Text Primitive Element with Attributes
      TEXT COLOUR
      CHARACTER HEIGHT
      TEXT FONT INDEX
      CHARACTER ORIENTATION
      TEXT
   Filled-Area Primitive Elements with Attributes
      FILL COLOUR
      INTERIOR STYLE (1= solid, 3=hatch, or 4 = empty)
      EDGE VISIBILITY (0=off, 1 = on)
      EDGE WIDTH
      EDGE TYPE (1=solid, 2=dashed, 3=dot, 4=dash-dot, 5=dash-dot-dot)
      EDGE COLOUR
      POLYGON
      POLYGON SET
      ELLIPSE
      ELLIPTICAL ARC CLOSE
      RECTANGLE
      CIRCLE
      CIRCULAR ARC CENTER CLOSE
   Line Primitive Elements with Attributes
      LINE WIDTH
      LINE TYPE (1=solid, 2=dashed, 3=dot, 4=dash-dot, 5=dash-dot-dot)
      LINE COLOUR
      POLYLINE
      ELLIPTICAL ARC
      CIRCULAR ARC CENTER

e. Metafile Control Elements
   TRANSPARENCY
   AUXILIARY COLOUR

7.1.2 CGM binary encoding. CGM commands in the CGM implementation for BPCGM are encoded using the binary encoding method described in the ISO/IEC 8632. Metafile elements will be represented in the binary encoding in either short-form commands or long-form commands.

7.1.3 CGM element flow. The following sequence of commands is used to describe all CGM graphics required for the BPCGM implementation for NSIF. The following flow diagram displays all the CGM commands for the NSIF implementation that could be contained in a metafile. The commands enclosed in brackets are optional within a given metafile and are used only when needed to describe the desired graphical symbol. Commands following the BEGIN PICTURE BODY command may be repeated to

describe multiple graphics within the same metafile. The commands are executed in sequential order.

BEGIN METAFILE

METAFILE VERSION
METAFILE ELEMENT LIST
METAFILE DESCRIPTION
[FONT LIST]

BEGIN PICTURE

COLOUR SELECTION MODE
[EDGE WIDTH SPECIFICATION MODE]
[LINE WIDTH SPECIFICATION MODE]
VDC EXTENT

BEGIN PICTURE BODY

[TRANSPARANCY]
[AUXILLIARY COLOUR]
[TEXT COLOUR]
[CHARACTER HEIGHT]
[TEXT FONT INDEX]
[CHARACTER ORIENTATION]
[TEXT]
[FILL COLOUR]
[INTERIOR STYLE]
[EDGE VISIBILITY]
[EDGE WIDTH]
[EDGE TYPE]
[EDGE COLOUR]
[POLYGON]
[POLYGON SET]
[ELLIPSE]
[ELLIPTICAL ARC CLOSE]
[RECTANGLE]
[CIRCLE]
[CIRCULAR ARC CENTER CLOSE]

[LINE WIDTH]
[LINE TYPE]
[LINE COLOUR]
[POLYLINE]
[ELLIPTICAL ARC]
[CIRCULAR ARC CENTER]

END PICTURE

END METAFILE

7.1.4 CGM element defaults for input. The CGM implementation for BPCGM01.00 shall assume the following CGM default values for input per Table I. Table I lists the CGM default values that represent the assumed "starting state" for interpreting metafiles. The BPCGM implementation for NSIF shall assume all CGM default values as stated in Part 3 - Binary Encoding in the ISO/IEC 8632, Clause 6, for each CGM that the CGM implementation inputs and interprets when these elements are not expressly included in the CGM unless otherwise specified in this document.

Table I. CGM element defaults for input/output.

Element	Input Default	Output Default
VDC TYPE:	16 BIT INTEGER	*16 BIT INTEGER
INTEGER PRECISION:	16 BIT INTEGER	*16 BIT INTEGER
INDEX PRECISION:	16 BIT INTEGER	*16 BIT INTEGER
COLOUR PRECISION:	8 BIT INTEGER	*8 BIT INTEGER
TRANSPARENCY:	ON	**None specified
LINE TYPE:	1 (SOLID)	**None specified.
TEXT PRECISION:	STRING	*STRING
CHARACTER EXPANSION FACTOR:	1.0	*1.0
CHARACTER SPACING:	0.0	*0.0
CHARACTER ORIENTATION:	0, 1, 1, 0	*0, 1, 1, 0
TEXT PATH:	RIGHT	*RIGHT
TEXT ALIGNMENT:	NORMAL HORIZONTAL, NORMAL VERTICAL	*NORMAL HORIZONTAL, *NORMAL VERTICAL
INTERIOR STYLE:	HOLLOW (EMPTY)	**None specified.
EDGE TYPE:	1 (SOLID)	**None specified.
EDGE VISIBILITY:	OFF	**None specified.
LINE COLOUR:	DEVICE-DEPENDENT FOREGROUND COLOUR	**None specified.
EDGE COLOUR:	DEVICE-DEPENDENT FOREGROUND COLOUR	**None specified.
FILL COLOUR:	DEVICE-DEPENDENT FOREGROUND COLOUR	**None specified.
TEXT COLOUR:	DEVICE-DEPENDENT FOREGROUND COLOUR	**None specified.
BACKGROUND COLOUR:	IN BPCGM NOT DEFINED. THIS IS NSIF SPECIFIC - TREAT AS TRANSPARENT	IN BPCGM NOT DEFINED. THIS IS NSIF SPECIFIC - TREAT AS TRANSPARENT
COLOUR VALUE EXTENT:	000,000,000 - 255,255,255	*000,000,000 - 255,255,255
VDC INTEGER PRECISION:	16 BIT INTEGER	*16 BIT INTEGER
TEXT FONT INDEX:	1	**None specified.
HATCH INDEX	Horizontal (1)	**None specified.

Notes:
* The profile specifies a single value or option for these elements. Although permitted, these elements never need to appear in a BPCGM metafile.

** When the element is pertinent to the CGM being output, the element shall be present in the output metafile and populated with a valid value(s) from among those specified in this profile.

7.1.4 CGM element defaults for input and output. The CGM implementation for BPCGM01.00 shall assume CGM default element values for input and output per Table I.

a. For input, the CGM default values represent the assumed "starting state" for interpreting metafiles. The BPCGM implementation for NSIF shall assume all CGM default values as stated in Part 3 - Binary Encoding in the ISO/IEC 8632, Clause 6, for each CGM that the CGM implementation inputs and interprets when these elements are not expressly included in the CGM unless otherwise specified in this document.
b. For output, those elements specified in this profile as having a single value or option, although permitted, never need to appear in a BPCGM metafile.

7.1.4.1 Device-Dependent Foreground Colour for input.. When LINE, EDGE, FILL, TEXT colour elements are absent in a CGM metafile, the display device will attempt to display using available foreground colour; perhaps the application's pre-set foreground colour when attempting to read the flawed metafile. The read/display application will do its best to portray the content of the CGM.

7.1.4.2 Background Colour for input. Although permitted, this element never needs to appear in a compliant metafile. If the Background Colour is included in the CGM metafile, the BPCGM implementation shall ignore it. In support of non-destructive overlays, the Background Colour shall be treated as "transparent." The NSIF Graphic Segment overlays are handled in a non-destructive manner. The overlays may be placed anywhere within the bounds of the CCS (defined for a specific NSIF File by the CLEVEL field). They may be placed totally on the Image Segment, partially on the IS, or entirely off of the IS. Any image segment or graphic segment can be placed on or under any other Segment, fully or partially. The visibility of pixel values of overlapping Segments is determined by the DLVL assigned to that Segment. Each displayable Segment (images and graphics) is assigned a DLVL (ranging from 001 to 999) that is unique within the NSIF File.

7.1.5 Metafile Description element contents required for input. The BPCGM implementation for NSIF shall be able to input, and interpret, a Metafile Description element that contains any of the following substrings. To support legacy metafiles, the following two descriptors may appear in the NSIF file when re-using existing CGMs produced under the MIL-STD 2301A implementations.

"ProfileId: NITF/CGM-APP-2.0"
"ProfileId: NITF/CGM;ProfileEd:2301-2/Source:(producer);Date:(YYYYMMDD)"

For metafiles created under this profile, BPCGM01.00:

"ProfileId: BPCGM;ProfileEd:01.00/Source:(producer);Date:(YYYYMMDD)"

Where 'producer' is the application name and release/version of the application producing or modifying the BPCGM. The date shall reflect the creation date or more recent date of modification.

7.1.6 CGM element substitution. The BPCGM implementation for NSIF shall ignore or substitute for any CGM element and associated parameters encountered when interpreting CGM elements not supported in this profile, and continue to interpret the next element supported in the CGM implementation for NSIF. The following is a summary of features that CGM implementations may substitute when interpreting/reading CGM that contains elements not supported in this profile.

Font names for input. The BPCGM implementation for NSIF shall use a system font for unsupported font name specified in the Font List element.

Edge widths for input. The BPCGM implementation for NSIF shall be able to substitute default system edge widths for any unsupported edge widths from the Edge Width element.

Line widths for input. The BPCGM implementation for NSIF shall be able to substitute default system line widths for any unsupported line type from the Line type element.

Edge types for input. The BPCGM implementation for NSIF shall be able to substitute solid edge type for any unsupported edge type from the Edge Type element.

Line types for input. The BPCGM implementation for NSIF shall be able to substitute solid line type for any unsupported line type from the Line Type element.

Interior styles for input. The BPCGM implementation for NSIF shall be able to substitute empty interior style type for any unsupported interior style type from the Interior Style element.

Character Heights requirements for input. The BPCGM implementation for NSIF shall be able to substitute default system text heights for any unsupported character height from the Character Height element. The implementation shall at least support character heights 6 through 72, although not all values within the range need to be supported for each font. When receiving an unsupported character height, the substituted height shall be the next lowest supported value for the font.

Default Colours. The BPCGM implementation for NSIF shall substitute available system Colours for unsupported Colours specified in the Text Colour element, Fill Colour element, Edge Colour element, and the Line Colour element.

7.1.7 CGM error messages. The BPCGM implementation for NSIF should report errors encountered during the input and interpretation of the CGM. It should also report when ignoring and/or substituting for elements not supported in this profile.

7.1.8 CGM element defaults for output. The BPCGM implementation for NSIF shall assume all CGM default values as stated in Clause 6, Part 3 - Binary Encoding, in the ISO/IEC 8632 for each CGM that the CGM implementation generates and outputs unless, otherwise specified in this document. See Table I for CGM default values for output.

7.1.9 CGM output required elements. The following CGM elements are required for each CGM that the CGM implementation generates and outputs:

a. Begin Metafile

b. Metafile Version

c. Metafile Element List

d. Metafile Description

e. Begin Picture

f. Colour Selection Mode

g. VDC Extent

h. Begin Picture Body

i. End Picture

j. End Metafile

7.1.10 Metafile Description element contents required for output. The BPCGM implementation for NSIF shall be able to output and generate the Metafile Description element that contains one of the following substrings. The legacy descriptors may appear in the metafile when re-using existing CGMs produced under the MIL-STD 2301A implementations, otherwise the BPCGM string specific to this profile shall be used.

"ProfileId:NITF/CGM-APP-2.0"
"ProfileId: NITF/CGM;ProfileEd:2301-2/Source:(producer);Date:(YYYYMMDD)"

For the BPCGM files:

"ProfileId: BPCGM;ProfileEd:01.00/Source:(producer);Date:(YYYYMMDD)"

Where 'producer' is the application name and release/version of the application producing or modifying the BPCGM. The date shall reflect the creation date or more recent date of modification.

7.1.11 The following is a summary of features required for CGM implementations when generating CGM for BPCGM Profile minimal compliance:

Font List number for output. The BPCGM implementation for NSIF shall provide the capability to generate and output, at most, 32 font name entries in the Font List element.

Text Font Index required for output. The index of every Text Font Index element shall be less than or equal to (≤) the number of fonts specified in the Font List element for any CGM implementation generated for NSIF. The Font List element is required for each CGM that contains a Text Font Index element.

BPCGM01.00 supported font names for output**.** The BPCGM implementation for NSIF shall limit the font name in the Font List element to the following list:

HERSHEY/CARTOGRAPHIC_ROMAN
HERSHEY/CARTOGRAPHIC_GREEK
HERSHEY/SIMPLEX_ROMAN
HERSHEY/SIMPLEX_GREEK
HERSHEY/SIMPLEX_SCRIPT
HERSHEY/COMPLEX_ROMAN
HERSHEY/COMPLEX_GREEK
HERSHEY/COMPLEX_SCRIPT
HERSHEY/COMPLEX_ITALIC
HERSHEY/COMPLEX_CYRILLIC
HERSHEY/DUPLEX_ROMAN
HERSHEY/TRIPLEX_ROMAN
HERSHEY/TRIPLEX_ITALIC
HERSHEY/GOTHIC_GERMAN
HERSHEY/GOTHIC_ENGLISH
HERSHEY/GOTHIC_ITALIAN
TIMES_ROMAN
TIMES_ITALIC
TIMES_BOLD
TIMES_BOLD_ITALIC
HELVETICA
HELVETICA_OBLIQUE
HELVETICA_BOLD
HELVETICA_BOLD_OBLIQUE
COURIER
COURIER_BOLD
COURIER_ITALIC
COURIER_BOLD_ITALIC

Edge widths for output. The BPCGM implementation for NSIF shall provide the capability to generate and output edge widths of two, four, or six**,** and optionally, of 1 through 100 for the Edge Width element.

Line widths for output. The BPCGM implementation for NSIF shall provide the capability to generate and output line widths of two, four, or six**,** and optionally, of 1 through 100 for the Line Width element.

Edge types required for output. The BPCGM implementation for NSIF shall generate and output one or more edge types of solid (1)**,** dashed (2), dotted (3), dash-dot (4), and dash-dot-dot (5), to the Edge Type element.

Line types required for output. The BPCGM implementation for NSIF shall generate and output one or more line types of solid (1)**,** dashed (2), dotted (3), dash-dot (4), and dash-dot-dot (5), to the Line Type element.

Interior styles required for output. The BPCGM implementation for NSIF shall generate and output one or more interior styles of solid (1), hatch (3), empty (4), to the Interior Style element.

Text element requirements for output. The BPCGM implementation for NSIF shall generate and output the Text element with text string parameter not to exceed 254 characters.

Character Height requirements for output. The BPCGM implementation for NSIF shall generate and output the Character Height element with a value no less than 6. There is no constraint on the upper limit value. (Note: interpret implementations must at least support the range of 6 through 72.)

Polyline element requirements for output. The BPCGM implementation for NSIF shall generate and output the Polyline element with at least two and no more than 4096 vertices.

Polygon and Polygon Set element requirements for output. The BPCGM implementation for NSIF shall generate and output the Polygon element with at least three vertices and no more than 4096 vertices.

Generate and output sequential order. The BPCGM implementation for NSIF shall generate and output CGM elements in the sequential order intended for interpretation.

7.1.12 Degeneracy. The BPCGM implementation for NSIF is precluded from generating and outputting degenerate CGM elements.

7.2 Completed profile proforma. This clause completes the Profile Proforma from ISO/IEC 8632 (Amendment 1) as required by the standard and is detailed in the following tables which are copied, including the table numbers, from that standard. The corrections, which have been approved by ISO, are included in the tables. The references in the proforma are to ISO/IEC 8632 and to ISO/IEC 8632 Amendment 1.

The following tables come from ISO/IEC 8632-3, Second edition 1992-10-01, AMENDMENT 1 1994-12-15

Part 1:

Functional specification

AMENDMENT 1: Rules for profiles

Table 13 - Metafile rules

Functionality	Specifications – PPF	Specifications - Model Profile
T.13.1	Same as Model Profile ☐	
Encodings	Select 1 or more encodings: Binary ☒ Character ☐ Char text ☐	Select 1 or more encodings: Binary ☒ Character ☒ Char text ☒
T.13.2	Same as Model Profile ☐	
Number of pictures	Number of pictures permitted in a metafile: minimum (0)? ***1.*** maximum (0 or no limit)? ***1.*** Other: ***None.***	Number of pictures permitted in a metafile: minimum (0)? *1.* maximum (0 or no limit)? *No limit.* Other: *None.*
T.13.3	Same as Model Profile ☒	
Empty pictures	Are pictures allowed which have no graphical primitives? (yes/no) Other:	Are pictures allowed which have no graphical primitives? (yes/no) *Yes*. Other: *None.*
T.13.4	Same as Model Profile ☐	
Metafile size	Any restrictions on metafile size? ***Yes.*** Other: ***2 Mbytes (2,097,152 bytes)***	Any restrictions on metafile size? *None.* Other: *None.*

Table 14 - Multi-element rules

Functionality	Specifications – PPF	Specifications - Model Profile
T.14.1	Same as Model Profile ☐	
Colour References 7.5.4.1	Select which rule applies to each metafile (choose 1): Either all colours or none shall be defined. ☐ All colours shall be defined. ☒ No colours shall be defined. ☐ Are colour indexes all allowed to be redefined within a picture or metafile? (yes/no) ***Yes.*** Any restrictions on the number of distinct colours used within a picture or metafile? (Monochrome metafiles shall use at most two distinct colours.) ***None.*** Are conformance categories defined? (yes/no) ***Yes.*** If yes, specify. ***Colour 8 bit RGB only.*** Other: ***This profile will always define foreground colours, but will leave background colour as undefined. See clauses 3 and 7.1.4.2***	Select which rule applies to each metafile (choose 1): Either all colours or none shall be defined. ☒ All colours shall be defined. ☐ No colours shall be defined. ☐ Are colour indexes all allowed to be redefined within a picture or metafile? (yes/no) *No.* Any restrictions on the number of distinct colours used within a picture or metafile? (Monochrome metafiles shall use at most two distinct colours.) *None*. Are conformance categories defined? (yes/no) Yes. If yes, specify. *3 categories: monochrome, greyscale, and colour.* Other: *None.*

Table 14 - Multi-element rules (continued)

Functionality	Specifications – PPF	Specifications - Model Profile
T.14.2 Line primitives - geometric degeneracies References 7.5.4.3	Same as Model Profile ☐	
	Geometric degeneracies are: Permitted ☐ Prohibited ☒ If permitted. graphical meaning of the degeneracy: Other:	Geometric degeneracies are: Permitted ☒ Prohibited ☐ If permitted. graphical meaning of the degeneracy: *A line primitive element, whose entire locus is a single point, denotes a graphical dot which is a filled circle, with diameter equal to the current line width and colour equal to the current line colour.* Other: *None.*
T.14.3 Filled area primitives - geometric degeneracies References 7.5.4.4	Same as Model Profile ☐	
	Geometric degeneracies are: Permitted ☐ Prohibited ☒ If permitted. graphical meaning of the degeneracy: Other:	Geometric degeneracies are: Permitted ☒ Prohibited ☐ If permitted. graphical meaning of the degeneracy: *A filled-area primitive element, whose entire locus is either a single point or a line has the following meaning:* *- If the locus of a filled-area primitive is a single point, then the meaning is a dot (which is a filled circle).* *- If the locus of a filled-area primitive is a non-degenerate line segment, then the meaning is a line.* *The dot or line is displayed with the fill colour if EDGE VISIBILITY is 'off ', unless INTERIOR STYLE is 'empty', in which case it is not rendered. If EDGE VISIBILITY is 'on', the interior treatment is the dot or line displayed in the fill colour, and then a dot or line superimposed with the current edge attributes.* Other: *None.*
T.14.4 Graphical text strings References 7.5.4.5	Same as Model Profile ☐	
	Minimum string length (bytes): ***0*** Maximum string length (bytes): ***254*** Any restrictions on the use of ISO/IEC 2022 switching controls? **Not permitted.** Other**:**	Minimum string length (bytes): *0.* Maximum string length (bytes): *254.* Any restrictions on the use of ISO/IEC 2022 switching controls? *Any character set used in the metafile which is accessed by ISO/IEC 2022 switching techniques shall be in the Character Set List (defined in this profile). C0 control codes (except NUL and ISO/IEC 2022 switching are prohibited.* Other: *None.*
T.14.5 Non-graphical text strings References 7.5.4.6	Same as Model Profile ☐	
	Maximum string length (bytes): for type SF: ***Begin Picture, Begin Metafile, 254 bytes, font list 1024 bytes.*** for type SF within type D: ***Not applicable*** Format effectors and ESC: Permitted ☐ Prohibited ☒ Other C0 control codes (except NUL and ISO/IEC 2022 switching) are prohibited. Any limits on the set of acceptable character sets? ***Yes, ISO 10646-1 Character Set Basic Latin.*** Any restrictions on the use of ISO/IEC 2022 switching controls? ***Yes, not permitted.*** Other: ***None.***	Maximum string length (bytes): for type SF: *254.* for type SF within type D: *1024.* Format effectors and ESC: Permitted ☒ Prohibited ☐ Other C0 control codes (except NUL and ISO/IEC 2022 switching) are prohibited. Any limits on the set of acceptable character sets? *The permitted character sets are ISO 8859-1 LHS No. 1 and ISO 8859-1 RHS No. 1.* Any restrictions on the use of ISO/IEC 2022 switching controls? *Any character set used in the metafile which is accessed by ISO/IEC 2022 switching techniques shall be in the character set list (defined in this profile).* Other: *None.*

Table 14 - Multi-element rules (continued)

Functionality	Specifications – PPF	Specifications - Model Profile
T.14.6 Data record strings References 7.5.4.7	Same as Model Profile ☒ Maximum string length (bytes) or state "no limit": SDR-coding techniques must be used (see annex C.2.2). Other:	[redacted] Maximum string length (bytes) or state "no limit": *32767.* SDR-coding techniques must be used (see annex C.2.2). Other: *None.*

Table 15 - Delimiter elements

Element	Specifications - PPF	Specifications - Model Profile
T.15.1 BEGIN METAFILE END METAFILE [v1] References 5.2.1 5.2.2 7.5.4.6 T.14.5	Same as Model Profile ☒ Element is: Required ☐ The *metafile identifier* shall follow the rules for non-graphical text. clause 7.5.4.6 and T.14.5. Other:	[redacted] Element is: Required ☒ The *metafile identifier* shall follow the rules for non-graphical text. clause 7.5.4.6 and T.14.5. Other: *None.*
T.15.2 BEGIN PICTURE BEGIN PICTURE BODY END PICTURE [v1] References 5.2.3 5.2.4 5.2.5 7.5.4.6 T.14.5	Same as Model Profile ☐ Element is: Required ☒ Permitted ☐ Prohibited ☐ The picture identifier shall follow the rules for non-graphical text. clause 7.5.4.6 and T.14.5 Number of occurrences of these elements allowed in the metafile: ***1.*** Other: ***None.***	[redacted] Element is: Required ☐ Permitted ☒ Prohibited ☐ The picture identifier shall follow the rules for non-graphical text. clause 7.5.4.6 and T.14.5 Number of occurrences of these elements allowed in the metafile: *No limit.* Other: *None.*
T.15.3 BEGIN SEGMENT END SEGMENT [v2] References 5.2.6 5.2.7	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Maximum number of simultaneously defined segments (both global and local) at any point in the metafile: . Any limits on the number of elements or restrictions on which elements compose a segment? Is there any meaning given to the *segment identifier* parameter? (yes/no) If yes, specify. (Meaning shall have no graphical effect.) Other:	[redacted] Element is: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of simultaneously defined segments (both global and local) at any point in the metafile: *1024.* . Any limits on the number of elements or restrictions on which elements compose a segment? *None.* Is there any meaning given to the *segment identifier* parameter? (yes/no) *No.* If yes, specify. (Meaning shall have no graphical effect.) Other: *When global segments are specified in the Metafile Descriptor, all global segment definitions shall follow all other Metafile Descriptor elements. When segments are specified in the Picture Descriptor, all such segment definitions shall follow all other Picture Descriptor elements.*

Table 15 - Delimiter elements (continued)

Element	Specifications – PPF	Specifications - Model Profile
T.15.4 BEGIN FIGURE END FIGURE [v2] References 5.2.8 5.2.9	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Limits on the number of elements or restrictions on which elements comprise a figure definition: Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Limits on the number of elements or restrictions on which elements comprise a figure definition: *Maximum number of elements = 128. No restrictions on which eligible elements may be included.* Other: *None.*
T.15.5 BEGIN PROTECTION REGION END PROTECTION REGION [v3] References 5.2.10 5.2.11	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Maximum number of simultaneously defined protection regions: Maximum number of elements within each protection region: Is there any meaning to the *region index* parameter other than as a unique identifier for each protection region? (yes/no) If yes, specify. (Meaning shall have no graphical effect.) Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of simultaneously defined protection regions: *32.* Maximum number of elements within each protection region: *128.* Is there any meaning to the *region index* parameter other than as a unique identifier for each protection region? (yes/no) *No.* If yes, specify. (Meaning shall have no graphical effect.) Other: *None.*
T.15.6 BEGIN COMPOUND LINE END COMPOUND LINE [v3] References 5.2.12 5.2.13	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Limits on the number of elements and identity of elements comprising a path definition: Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Limits on the number of elements and identity of elements comprising a path definition: *Maximum number of elements is 128. No restrictions on which eligible elements may be included.* Other: *None.*
T.15.7 BEGIN COMPOUND TEXT PATH END COMPOUND TEXT PATH [v3] References 5.2.14 5.2.15	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Limits on the number and identity of elements comprising a path definition: Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Limits on the number and identity of elements comprising a path definition: *Maximum number of elements is 128. No restrictions on which eligible elements may be included.* Other: *None.*

Table 15 - Delimiter elements (continued)

Element	Specifications – PPF	Specifications - Model Profile
T.15.8 BEGIN TILE ARRAY END TILE ARRAY [v3] References 5.2.16 5.2.17	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒	Element is: Required ☐ Permitted ☒ Prohibited ☐
	Maximum number of tiles in path direction:	Maximum number of tiles in path direction: *16.*
	Maximum number of tiles in line direction:	Maximum number of tiles in line direction: *16.*
	Maximum number of cells/tile in path direction:	Maximum number of cells/tile in path direction: *1024.*
	Maximum number of cells/tile in line direction:	Maximum number of cells/tile in line direction: *1024.*
	Limits on pel path:	Limits on pel path: *None.*
	Limits on line progression:	Limits on line progression: *None.*
	Limits on image offset:	Limits on image offset: *None.*
	Other:	Other: *None.*

Table 16 - Metafile descriptor elements

Element	Specifications - PPF	Specifications - Model Profile
T.16.1 METAFILE VERSION [v1] References 5.3.1	Same as Model Profile ☐	
	Element is: Required ☒	Element is: Required ☒
	Metafile versions permitted by this profile: ***1.***	Metafile versions permitted by this profile: *1, 2, 3.*
	Other: ***None***.	Other: *None.*

T.16.2 METAFILE DESCRIPTION [v1] References 5.3.2 7.5.2.1 7.5.2.2 7.5.4.6 T.14.1 T.14.5	Same as Model Profile ☐	
	Element is: Required ☒ The *description* parameter shall follow the rules for non-graphical text, clause 7.5.4.6 and T.14.5. The substring within the SF parameter shall be of the form: "keyword:item", where the double quotes are part of the substring. Maximum number of occurrences of this element? ***Unlimited.*** Profile identification (use keyword, "ProfileId:"): ***"ProfileId:BPCGM"*** Profile edition (use keyword, "ProfileEd:"): ***"ProfileEd:01.00".*** If this profile edition is not given, then the edition defaults to 1 or for legacy purposes: ***"ProfileId: NITF/CGM-APP2.0"*** ***"ProfileId: NITF/CGM; ProfileEd:2301-2/Source:(producer); Date:(YYYYMMDD)"*** Additional information content: Metafile colour conformance class, source, and date items shall be encoded as substrings of the *description* parameter using the keywords: "ColourClass:", "Source:", and "Date:", respectively. ColourClass: Required ☐ Permitted ☒ Content: ***Although permitted, this element never needs to appear in a compliant metafile. If present content: (one of colour, greyscale, monochrome)*** Source: Required ☐ Permitted ☒ Content: ***(producer)*** Date: Required ☐ Permitted ☒ Content: shall be date of metafile generation. Other:	Element is: Required ☒ The *description* parameter shall follow the rules for non-graphical text, clause 7.5.4.6 and T.14.5. The substring within the SF parameter shall be of the form: "keyword:item", where the double quotes are part of the substring. Maximum number of occurrences of this element? *Unlimited.* Profile identification (use keyword, "Profiled:"): ***"ProfileId:Model-Profile".*** Profile edition (use keyword, "Profiled:"): ***"ProfileEd:1".*** If this profile edition is not given, then the edition defaults to 1. Additional information content: Metafile colour conformance class, source, and date items shall be encoded as substrings of the *description* parameter using the keywords: "ColourClass:", "Source:", and "Date:", respectively. ColourClass: Required ☒ Permitted ☐ Content: *(One of: colour, greyscale, or monochrome).* Source: Required ☒ Permitted ☐ Content: *(Vendor, product, and version).* Date: Required ☒ Permitted ☐ Content shall be date of metafile generation. *The form and content shall be in accordance with ISO 8601:1988.* Other: *None.*

Table 16 - Metafile descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.16.3 VDC TYPE [v1] Reference: 5.3.3	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? ***Integer.*** Other: ***None.***	Element is: Required ☒ Permitted ☐ Any restrictions on the parameter value? *None.* Other: *None.*
T.16.4 INTEGER PRECISION [v1] References: 5.3.4	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: ***16 bit only.***	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: *None.*
T.16.5 REAL PRECISION [v1] References: 5.3.5	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ ***NOTE - Prohibited per binary encoding Table T.13.2.*** The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other:	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: *None.*
T.16.6 INDEX PRECISION [v1] Reference: 5.3.6	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: ***16 bit only. Since this profile only specifies a single value or option, this element although permitted, never needs to appear in a compliant metafile. See Table I of this profile.***	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: *None.*
T.16.7 COLOUR PRECISION [v1] References: 5.3.7	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: ***8 bit only. Since this profile only specifies a single value or option, this element although permitted, never needs to appear in a compliant metafile. See Table I of this profile.***	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: *None.*
T.16.8 COLOUR INDEX PRECISION [v1] References: 5.3.8	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: ***As BPCGM01.00 only allows Colour selection mode of 1, this is not applicable .***	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: *None.*

Table 16 - Metafile descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.16.9 MAXIMUM COLOUR INDEX [v1] Reference: 5.3.9	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ Is this element required to be a least upper bound? (yes/no) Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Is this element required to be a least upper bound? (yes/no) *No.* Any restrictions on the parameter values? *0-1 for monochrome metafiles.* *0-63 for greyscale metafiles.* *0-255 for colour metafiles.* Other: *None.*
T.16.10 COLOUR VALUE EXTENT [v1] References: 5.3.10	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter values? ***0, 0, 0, through 255, 255, 255.*** Other:	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter values? *None.* Other: *None.*
T.16.11 METAFILE ELEMENT LIST [v1] References 5.3.11	Same as Model Profile ☒	
	Element is: Required ☐ Other:	Element is: Required ☒ Other: *None.*
T.16.12 METAFILE DEFAULTS REPLACEMENT [v1] References 5.3.12	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ Is each occurrence of the MDR restricted to defining just one default? (yes/no) Additional restrictions may be specified in parts 2, 3, and 4 of ISO/IEC 8632. ***NOTE - Profile specifications regarding use of MDR shall be consistent with other profile specifications. For example, if a profile restricts metafiles to a single picture, then it makes little sense for the profile to require the MDR element in metafiles.*** Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Is each occurrence of the MDR restricted to defining just one default? (yes/no) *No.* Additional restrictions may be specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: *None.*

Table 16 - Metafile descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.16.13 FONT LIST [v1] References: 5.3.13 annex H	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ This element is required for all metafiles containing graphical text. Maximum number of fonts in the list: ***32.*** All font indexes referenced in the metafile, including the default (nominally index 1) shall be defined in the FONT LIST element, with font name construction consistent with the rules of ISO/IEC 9541. List of permitted fonts: ***See clause 7.1.11 of this profile.*** Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ This element is required for all metafiles containing graphical text. Maximum number of fonts in the list: *64.* All font indexes referenced in the metafile, including the default (nominally index 1) shall be defined in the FONT LIST element, with font name construction consistent with the rules of ISO/IEC 9541. List of permitted fonts: *Times-Roman*, *Times-Bol*, *Times-Italic*, *Times-BoldItalic*, *Helvetica*, *Helvetica-Bold*, *Helvetica-Oblique*, *Helvetica-BoldOblique*, *Courier*, *Courier-Bold*, *Courier-Oblique*, *Courier-BoldOblique*, *Symbol* ***NOTE - These font names are trademarked and some are proprietary and copyrighted. Times and Helvetica are registered trademarks of Allied Corporation, the owner of the copyright on the fonts of those names. Metric equivalents of the named fonts may be substituted by interpreters. Times is a serif font. Helvetica is a sans-serif font. Courier is a mono spaced, serif font. The association of character code to glyph which shall be used for each of the fonts and the metrics of the named fonts are contained in annex H.*** Other: *None.*
T.16.14 CHARACTER SET LIST [v1] References 5.3.14	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Maximum limit for the number of character sets in the character set list: ***1.*** Character sets shall be selected from the ISO Registry of Character Sets. This list may be extended by adding profile-defined character sets. List character sets: ***ISO 10646-1 Character Set Basic Latin.*** If any of these character sets is of type "complete code", specify the content of the complete code and its associated sequence tail: ***Not applicable.*** Other: ***None.***	Element is: Required ☐ Permitted ☒ Prohibited ☐ This element is required for all metafiles containing graphical text. Maximum limit for the number of character sets in the character set list: *4.* Character sets shall be selected from the ISO Registry of Character Sets. This list may be extended by adding profile-defined character sets. List character sets: *"94-character G-set", 4/2 (ISO 8859-1 LH);* *"96-character G-set", 4/1 (ISO 8859-1 RH);* *"94-character G-set", 2/10 3/10 (Symbol LH);* *"94-character G-set", 2/6 3/10 (Symbol RH);* If any of these character sets is of type "complete code", specify the content of the complete code and its associated sequence tail: *Not applicable.* Other: *None.*
T.16.15 CHARACTER CODING ANNOUNCER [v1] References 5.3.15	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter values? *Values shall be 'basic 7-bit' and 'basic 8-bit'.* Other: *None.*

Table 16 - Metafile descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.16.16 NAME PRECISION [v2] References: 5.3.16	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ ***NOTE - BPCGM01.00 supports version 1 only.*** The parameter value of this element is coding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other:	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other:
T.16.17 MAXIMUM VDC EXTENT [v2] References: 5.3.17	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter values? *None.* Other: *None.*
T.16.18 SEGMENT PRIORITY EXTENT [v2] References: 5.3.18	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter values? Other: *None.*
T.16.19 COLOUR MODEL [v3] References: 5.3.19	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter values? *None.* Other: *None.*
T.16.20 COLOUR CALIBRATION [v3] References 5.3.20	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ Calibration selection values permitted in accordance with the permitted model(s): If CYMK is permitted, minimum number of grid locations: Any restrictions on the number of colour lookup table entries, n? Any restrictions on the number of grid locations, m? If CYMK is permitted, algorithms for interpolation between grid locations? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Calibration selection values permitted in accordance with the permitted model(s): *Values 1..6, 9.* If CYMK is permitted, minimum number of grid locations: *1.* Any restrictions on the number of colour lookup table entries, n? *None.* Any restrictions on the number of grid locations, m? *None.* If CYMK is permitted, algorithms for interpolation between grid locations? *None.* Other: *None.*
T.16.21 FONT PROPERTIES [v3] References 5.3.21	Same as Model Profile ☐	
	Element is Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter values? *All defined index and enumerated values of all parameters shall be permitted.* Other: *None.*

Table 16 - Metafile descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.16.22 GLYPH MAPPING [v3] References 5.3.22	Same as Model Profile ☐	
	Required ☐ Permitted ☐ Prohibited ☒ Subset of AFH registered glyphs which may be referenced: Maximum number of glyphs which may be defined: Other:	Required ☐ Permitted ☒ Prohibited ☐ Subset of AFH registered glyphs which may be referenced: *None.* Maximum number of glyphs which may be defined: *8192.* Other: *None.*
T.16.23 SYMBOL LIBRARY LIST [v3] References 5.3.23	Same as Model Profile ☒	
	Required ☐ Permitted ☐ Prohibited ☐ Libraries which may be accessed and their encoding rules: Maximum number of libraries which may be accessed: Other:	Required ☐ Permitted ☐ Prohibited ☒ Libraries which may be accessed and their encoding rules: Maximum number of libraries which may be accessed: Other: ***NOTE - There are currently no registered symbol libraries.***

Table 17 - Picture descriptor elements

Element	Specifications - PPF	Specifications - Model Profile
T.17.1 SCALING MODE [v1] References: 5.4.1	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter values? *If SCALING MODE is metric then the 'metric scale factor' shall be positive.* Other: *None.*
T.17.2 COLOUR SELECTION MODE [v1] [v2] References: 5.4.2	Same as Model Profile ☐	
	Element: Required ☐ Permitted ☒ Any restrictions on the parameter values? ***Yes, always 0X0001.*** Other:	Element: Required ☐ Permitted ☒ Any restrictions on the parameter values? *None.* Other: *None.*
T.17.3 LINE WIDTH SPECIFICATION MODE [v1] [v2] References: 5.4.3	Same as Model Profile ☐	
	Element: Required ☐ Permitted ☒ Any restrictions on the parameter values? ***Yes, always 0X0000***. Other: ***Required when line primitives are present in CGM File.***	Element: Required ☐ Permitted ☒ Any restrictions on the parameter values? *None.* Other: *None.*
T.17.4 MARKER SIZE SPECIFICATION MODE [v1] [v2] References: 5.4.4	Same as Model Profile ☒	
	Element is: Required ☐ Permitted ☐ Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter values? *None.* Other: *None.*

Table 17 - Picture descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.17.5 EDGE WIDTH SPECIFICATION MODE [v1] [v2] References: 5.4.5	Same as Model Profile ☐ Element: Required ☐ Permitted ☒ Any restrictions on the parameter values? ***Yes, always 0X0000***. Other: ***Required when fill primitives are present in CGM file.***	Element: Required ☐ Permitted ☒ Any restrictions on the parameter values? *None.* Other: *None.*
T.17.6 VDC EXTENT [v1] References: 5.4.6	Same as Model Profile ☒ Element: Required ☐ Permitted ☐ Limits on the sense and orientation of the VDC space: Is zero-area VDC extent permitted? (yes/no). If yes, specify its meaning. Other:	Element: Required ☐ Permitted ☒ Limits on the sense and orientation of the VDC space: *None.* Is zero-area VDC extent permitted? (yes/no) *No.* If yes, specify its meaning. Other: *None.*
T.17.7 BACKGROUND COLOUR [v1] References: 5.4.7 7.5.4.1 T.14.1	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ The *colour value* parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Other: ***Although permitted, this element never needs to appear in a compliant metafile. For use with BIIF applications, the application will treat the CGM Background Colour as transparent. See clause 7.1.4.2 of this profile***	Element is: Required ☐ Permitted ☒ The *colour value* parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Other: *None.*
T.17.8 DEVICE VIEWPORT [v2] References: 5.4.8	Same as Model Profile ☒ Element: Required ☐ Permitted ☐ Prohibited ☐ Interaction of this element with environmental presentation directives: Meaning of this element if the specified value is inconsistent with the presentation device: Other:	Element: Required ☐ Permitted ☐ Prohibited ☒ Interaction of this element with environmental presentation directives: Meaning of this element if the specified value is inconsistent with the presentation device: Other: ***NOTE - This element is prohibited due to its device dependence.***
T.17.9 DEVICE VIEWPORT SPECIFICATION MODE [v2] References: 5.4.9	Same as Model Profile ☒ Element: Required ☐ Permitted ☐ Prohibited ☐ Set of legal values: Other:	Element: Required ☐ Permitted ☐ Prohibited ☒ Set of legal values: Other: ***NOTE - This element is prohibited due to its device dependence.***
T.17.10 DEVICE VIEWPORT MAPPING [v2] References: 5.4.10	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Prohibited ☐ Set of legal values: Other:	Element is: Required ☐ Permitted ☐ Prohibited ☒ Set of legal values: Other: ***NOTE - This element is prohibited due to its device dependence.***

Table 17 - Picture descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.17.11 LINE REPRESENTATION [v2] References: 5.4.11 7.5.2.6 7.5.4.2 T.20.1	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Maximum number of simultaneous bundle definitions: Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of simultaneous bundle definitions: *20.* Other: *None.*
T.17.12 MARKER REPRESENTATION [v2] References: 5.4.12 7.5.2.6 7.5.4.2 T.20.5	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Maximum number of simultaneous bundle definitions: Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of simultaneous bundle definitions: *20.* Other: *None.*
T.17.13 TEXT REPRESENTATION [v2] References: 5.4.13 7.5.2.6 7.5.4.2 T.20.9	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Maximum number of simultaneous bundle definitions: Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of simultaneous bundle definitions: *20.* Other: *None.*
T.17.14 FILL REPRESENTATION [v2] References: 5.4.14 7.5.2.6 7.5.4.2 T.20.21	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Maximum number of simultaneous bundle definitions: Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of simultaneous bundle definitions: *20.* Other: *None.*
T.17.15 EDGE REPRESENTATION [v2] References: 5.4.15 7.5.2.6 7.5.4.2 T.20.26	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Maximum number of simultaneous bundle definitions: Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of simultaneous bundle definitions: *20.* Other: *None.*
T.17.16 INTERIOR STYLE SPECIFICATION MODE [v3] References: 5.4.16	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restriction on the parameter value? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restriction on the parameter value? *None.* Other: *None.*

Table 17 - Picture descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.17.17 LINE AND EDGE TYPE DEFINITION [v3] References: 5.4.17	Same as Model Profile ☐	
	Element: Required ☐ Permitted ☒ Prohibited ☐ Any limits on the number of definitions? ***5. solid (1), dashed (2), dotted (3), dash-dot (4), and dash-dot-dot (5)*** Any limits on the number of elements in a given definition? ***No.*** Any restrictions on the dash cycle repeat length? ***None.*** Any restrictions on complexity of definition to prevent degeneracies? ***None.*** Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Any limits on the number of definitions? *Maximum of 32 line types shall be specified simultaneously.* Any limits on the number of elements in a given definition? *Number of values in the dash gap list shall not exceed 8.* Any restrictions on the dash cycle repeat length? *None.* Any restrictions on complexity of definition to prevent degeneracies? *None.* Other: *None.*
T.17.18 HATCH STYLE DEFINITION [v3] References: 5.4.18	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ Prohibited ☐ Limit on the number of hatch styles? ***6. horizontal (1), vertical (2), positive slope (3), negative slope (4), horizontal/vertical/crosshatch (5), and positive/negative slope cross(6).*** Limit on the number of gaps in a given definition? ***None*** Any limits on duty cycle length? ***None*** Any restrictions on complexity of definition to prevent degeneracies? ***None*** Any restrictions on the style indicator: ***None*** Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Limit on the number of hatch styles? *Maximum of 32 hatch styles shall be specified simultaneously.* Limit on the number of gaps in a given definition? *Number of entries in the gap width list shall not exceed 8.* Any limits on duty cycle length? *None.* Any restrictions on complexity of definition to prevent degeneracies? *None.* Any restrictions on the style indicator: *None.* Other: *None.*
T.17.19 GEOMETRIC PATTERN DEFINITION [v3] References: 5.4.19	Same as Model Profile ☐	
	Element: Required ☐ Permitted ☐ Prohibited ☒ Any limits on the number of geometric patterns defined? ***NOTE - The number of geometric patterns cannot exceed the number of segments***. Any limits on the classes of primitives? Other:	Element Required ☐ Permitted ☒ Prohibited ☐ Any limits on the number of geometric patterns defined? *The maximum number of geometric patterns is 64.* Any limits on the classes of primitives? *None.* Other: *None.*

Table 18 - Control Elements

Element	Specifications - PPF	Specifications - Model Profile
T.18.1 VDC INTEGER PRECISION [v1] References: 5.5.1	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ The parameter values of this element are encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: ***16 bit only. Since this profile only specifies a single value or option, this element although permitted, never needs to appear in a compliant metafile. See Table I in this profile.***	Element is: Required ☐ Permitted ☒ The parameter values of this element are encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: *None.*

Table 18 - Control Elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.18.2 VDC REAL PRECISION [v1] References: 5.5.2	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ ***NOTE - Prohibited per binary encoding Table T.14.2.*** The parameter values of this element are encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other:	Element: Required ☐ Permitted ☒ The parameter values of this element are encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: *None.*
T.18.3 AUXILIARY COLOUR [v1] References: 5.5.3 7.5.4.1 T.14.1 D.4.4.1	Same as Model Profile ☒ Element: Required ☐ Permitted ☐ Prohibited ☐ The auxiliary colour specifier parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ The auxiliary colour specifier parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Other: *None.*
T.18.4 TRANSPARENCY [v1] References: 5.4.4 T.14.1	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? ***None.*** Other: ***In this profile, default for transparency is set to on. When Auxiliary Colour is desired, transparency must be turned off. See Table I of this profile.***	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *None.* Other: *None.*
T.18.5 CLIP RECTANGLE [v1] References: 5.5.5 D.4.4.2	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Meaning of boundary cases for: zero-area: area greater than VDC extent: additional cases? ***NOTE - Because objects "inside and on the boundary are drawn", then zero area does not have the sometimes claimed effect of hiding subsequent primitives - there will be a visible effect, a dot or a line, if the object intersects the boundary of the degenerate area.*** Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Meaning of boundary cases for: zero-area: *Prohibited.* area greater than VDC extent: *Clipping shall be done to the intersection of CLIP RECTANGLE and VDC EXTENT.* additional cases? *None.* Other: *None.*
T.18.6 CLIP INDICATOR [v1] References: 5.5.6	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter value? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *None.* Other: *None.*
T.18.7 LINE CLIPPING MODE [v2] References: 5.5.7 D.4.4.3	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter value? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *None.* Other: *None.*

Table 18 - Control Elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.18.8 MARKER CLIPPING MODE [v2] References: 5.5.8 D.4.4.3	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter value? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *None.* Other: *None.*
T.18.9 EDGE CLIPPING MODE [v2] References: 5.5.9 D.4.4.3	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter value? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *None.* Other: *None.*
T.18.10 NEW REGION [v2] References: 5.5.10	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ This element shall be permitted only if **BEGIN FIGURE** is permitted. Any restrictions on the number of occurrences? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ This element shall be permitted only if **BEGIN FIGURE** is permitted. Any restrictions on the number of occurrences? *None.* Other: *None.*
T.18.11 SAVE PRIMITIVE CONTEXT [v2] References: 5.5.11	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Maximum number of simultaneously saved contexts: Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of simultaneously saved contexts: *1024.* Other: *None.*
T.18.12 RESTORE PRIMITIVE CONTEXT [v2] References: 5.5.12	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ This element is permitted only if *SAVE PRIMITIVE CONTEXT* is permitted. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ This element is permitted only if *SAVE PRIMITIVE CONTEXT* is permitted. Other: *None.*
T.18.13 PROTECTION REGION INDICATOR [v3] References: 5.5.13	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ This element shall be permitted only if *BEGIN PROTECTION REGION* is permitted. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ This element shall be permitted only if *BEGIN PROTECTION REGION* is permitted. Other: *None.*
T.18.14 GENERALIZED TEXT PATH MODE [v3] References: 5.5.14	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter value? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *None.* Other: *None.*
T.18.15 MITRE LIMIT [v3] References: 5.5.15	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter value? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *None.* Other: *None.*

Table 18 - Control Elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.18.16 TRANSPARENT CELL COLOUR [v3] References: 5.5.16	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ The transparent cell colour specifier parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ The transparent cell colour specifier parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Any restrictions on the parameter values? *None.* Other: *None.*

Table 19 - Graphical primitive elements

Element	Specifications - PPF	Specifications - Model Profile
T.19.1 POLYLINE [v1] References: 5.6.1 7.5.4.3 D.2.2.1	Same as Model Profile ☒	
	Element is: Required ☐ Permitted ☐ Prohibited ☐ Maximum number of points or state "no limit": Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of points or state "no limit": *4096.* Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other: *None.*
T.19.2 DISJOINT POLYLINE [v1] References: 5.6.2 7.5.4.3 D.2.2.1	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ Maximum number of points or state "no limit": Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of points or state "no limit": *4096.* Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other: *None.*
T.19.3 POLYMARKER [v1] References: 5.6.3	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ Maximum number of points or state "no limit": Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of points or state "no limit": *4096.* Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other: *None.*
T.19.4 TEXT [v1] References: 5.6.4 7.5.4.5	Same as Model Profile ☐	
	Element: Required ☐ Permitted ☒ Prohibited ☐ The string parameter shall follow the rules for graphical text, clause 7.5.4.5. Is the 'not final' flag allowed: (yes/no) ***No, append text not permitted.*** Other: ***None.***	Element: Required ☐ Permitted ☒ Prohibited ☐ The string parameter shall follow the rules for graphical text, clause 7.5.4.5. Is the 'not final' flag allowed: (yes/no) *Yes.* Other: *None.*

Table 19 - Graphical primitive elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.19.5 RESTRICTED TEXT [v1] References: 5.6.5 7.5.4.5 T.25.7 D.4.5.2	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ The string parameter shall follow the rules for graphical text, clause 7.5.4.5. Is the 'not final' flag allowed: (yes/no) For [v1/2] metafiles, is the realization of *RESTRICTED TEXT* according to one of the standard or registered values for *RESTRICTED TEXT TYPE*? (yes/no) If yes, specify. For [v3] metafiles, *RESTRICTED TEXT TYPE* shall be used if this element is used. Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ The string parameter shall follow the rules for graphical text, clause 7.5.4.5. Is the 'not final' flag allowed: (yes/no) *Yes.* For [v1/2] metafiles, is the realization of *RESTRICTED TEXT* according to one of the standard or registered values for *RESTRICTED TEXT TYPE*? (yes/no) If yes, specify. *Boxed-cap, also see T.25.7.* For [v3] metafiles, *RESTRICTED TEXT TYPE* shall be used if this element is used. Other: *None.*
T.19.6 APPEND TEXT [v1] References: 5.6.6 7.5.4.5 D.4.5.1	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ The string parameter shall follow the rules for graphical text, clause 7.5.4.5. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ The string parameter shall follow the rules for graphical text, clause 7.5.4.5. Other: *None.*
T.19.7 POLYGON [v1] References: 5.6.7 7.5.4.4 D.2.2.2	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Prohibited ☐ Maximum number of points: Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of points: *4096.* Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other: *None.*
T.19.8 POLYGON SET [v1] References: 5.6.8 7.5.4.4 D.2.2.2	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Prohibited ☐ Maximum number of points: Number of polygons in a set? Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of points: *4096.* Number of polygons in a set? *No limit.* Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other: *Each individual polygon within a set shall have at least 3 points.*
T.19.9 CELL ARRAY [v1] References: 5.6.9 D.4.5.3	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Limit for nx: Limit for ny: Limit for nx * ny: Are rotated and skewed cell arrays allowed? (yes/no) If yes, specify the graphical meaning. Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Limit for nx: *2048.* Limit for ny: *2048.* Limit for nx * ny: *4194304.* Are rotated and skewed cell arrays allowed? (yes/no) *No.* If yes, specify the graphical meaning. Other: *Zero-area arrays are prohibited.*

Table 19 - Graphical primitive elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.19.10 GENERALIZED DRAWING PRIMITIVE [v1] References: 5.6.10	Same as Model Profile ☒ Element: Required ☐ Permitted ☐ Prohibited ☐ List all registered GDP's that are allowed: List all profile-defined GPD's that are allowed and attach complete description: Other:	Element: Required ☐ Permitted ☐ Prohibited ☒ List all registered GDP's that are allowed: List all profile-defined GPD's that are allowed and attach complete description: ***NOTE - Only registered GPD's and profile-defined GPD's shall be allowed in profiles.*** Other:
T.19.11 RECTANGLE [v1] References: 5.6.11 7.5.4.4 D.2.2.2	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Prohibited ☐ Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other: *None.*
T.19.12 CIRCLE [v1] References: 5.6.12 7.5.4.3 D.2.2.2	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Prohibited ☐ Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other: *None.*
T.19.13 CIRCULAR ARC 3 POINT [v1] References: 5.6.13 7.5.4.3 D.2.2.2 D.4.5.4	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other: *Each individual polygon within a set shall have at least 3 points.*
T.19.14 CIRCULAR ARC 3 POINT CLOSE [v1] References: 5.6.14 7.5.4.4 D.2.2.2 D.4.5.5	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other: *None.*
T.19.15 CIRCULAR ARC CENTRE [v1] References: 5.6.15 7.5.4.3 D.2.2.2 D.4.5.6	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other: ***When producing circular or elliptical arcs, the CGM implementation will not select the same or adjacent pixels at the point where the vectors cross the circumference of the arc at full resolution.***	Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other: *None.*

Table 19 - Graphical primitive elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.19.16 CIRCULAR ARC CENTRE CLOSE [v1] References: 5.6.13 7.5.4.4 D.2.2.2 D.4.5.7	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other: ***When producing circular or elliptical arcs, the CGM implementation will not select the same or adjacent pixels at the point where the vectors cross the circumference of the arc at full resolution.***	Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-length geometric degeneracies shall be as defined in clause 7.5.4.4. Other: *None.*
T.19.17 ELLIPSE [v1] References: 5.6.17 7.5.4.3 D.4.5.9 D.4.5.10	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Prohibited ☐ Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other: *None.*
T.19.18 ELLIPTICAL ARC [v1] References: 5.6.18 7.5.4.3 D.2.2.1 D.4.5.11	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other: ***When producing circular or elliptical arcs, the CGM implementation will not select the same or adjacent pixels at the point where the vectors cross the circumference of the arc at full resolution.***	Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other: *None.*
T.19.19 ELLIPTICAL ARC CLOSE [v1] References: 5.6.19 7.5.4.4 D.2.2.2 D.4.5.12	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other: ***When producing circular or elliptical arcs, the CGM implementation will not select the same or adjacent pixels at the point where the vectors cross the circumference of the arc at full resolution.***	Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-length geometric degeneracies shall be as defined in clause 7.5.4.4. Other: *None.*
T.19.20 CIRCULAR ARC CENTRE REVERSED [v2] References: 5.6.20 7.5.4.3 D.2.2.1 D.4.5.8	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-area geometric degeneracies shall be as defined in clause 7.5.4.4. Other: *None.*
T.19.21 CONNECTING EDGE [v2] References: 5.6.21 7.5.4.3 D.2.2.1	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ This element shall be permitted only if **BEGIN/END FIGURE** is permitted. Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ This element shall be permitted only if **BEGIN/END FIGURE** is permitted. Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other: *None.*

Table 19 - Graphical primitive elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.19.22 HYPERBOLIC ARC [v3] References: 5.6.22 7.5.4.3 D.2.2.1	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other: *None.*
T.19.23 PARABOLIC ARC [v3] References: 5.6.23 7.5.4.3 D.2.2.1	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other: *None.*
T.19.24 NON-UNIFORM B-SPLINE [v3] References: 5.6.24 7.5.4.3 D.2.2.1	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Set of spline orders: Maximum number of control points: Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Set of spline orders: *Cubic spline.* Maximum number of control points: *4096.* Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other: *None.*
T.19.25 NON-UNIFORM RATIONAL B-SPLINE [v3] References: 5.6.25 7.5.4.3 D.2.2.1	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Set of spline orders: Maximum number of control points: Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Set of spline orders: *Cubic spline.* Maximum number of control points: *4096.* Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other: *None.*
T.19.26 POLYBEZIER [v3] References: 5.6.26 7.5.4.3 D.2.2.1	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Maximum number of points: Any restrictions on the continuity indicator? Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of points: *4096.* Any restrictions on the continuity indicator? *None.* Zero-length geometric degeneracies shall be as defined in clause 7.5.4.3. Other: *None.*
T.19.27 POLYSYMBOL [v3] References: 5.6.27 D.2.2.1	Same as Model Profile ☒ Element: Required ☐ Permitted ☐ Prohibited ☐ Point list:: Effect of a reference to a symbol index parameter which is not in the symbol library: Other:	Element: Required ☐ Permitted ☐ Prohibited ☒ Point list:: Effect of a reference to a symbol index parameter which is not in the symbol library: Other: ***NOTE - This element is prohibited because SYMBOL LIBRARY LIST is prohibited.***

Table 19 - Graphical primitive elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.19.28 BITONAL TILE [v3] References: 5.6.28 D.2.2.1 D.4.5.13	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ List allowable compression types: Requirements on row padding: Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ List allowable compression types: *Values 0..6.* Requirements on row padding: *None.* Other: *CCITT compression methods (T6 and T4) should be used with 1 bit cell colour precision and indexed colour.* ***NOTE - Work is in progress on registration of JPEG. When JPEG is registered, it may be added to the allowable compression type values in a future edition of this profile.***
T.19.29 TILE [v3] References: 5.6.29 D.2.2.1 D.4.5.13	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ List allowable compression types: Requirements on row padding: Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ List allowable compression types: *Values 0..6.* Requirements on row padding: *None.* Other: *CCITT compression methods (T6 and T4) should be used with 1 bit cell colour precision and indexed colour.* ***NOTE - Work is in progress on registration of JPEG. When JPEG is registered, it may be added to the allowable compression type values in a future edition of this profile.***

Table 20 - Attribute elements

Element	Specifications - PPF	Specifications - Model Profile
T.20.1 LINE BUNDLE INDEX [v1] References: 5.7.1 7.5.4.2 D.4.6.1 T.17.11	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ The line bundle index parameter shall follow the rules for indexes, clause 7.5.4.2. For [v1] metafiles, allowable index values: For [v2/3] metafiles, any referenced bundle shall have an explicit representation definition. Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ The line bundle index parameter shall follow the rules for indexes, clause 7.5.4.2. For [v1] metafiles, allowable index values: *1..5.* *Index* 1 2 3 4 5 *line type* 1 2 3 4 5 *line width* 1.0 1.0 1.0 1.0 1.0 *line colour* 1 1 1 1 1 For [v2/3] metafiles, any referenced bundle shall have an explicit representation definition. Other: *None.*

Table 20 - Attribute elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.20.2 LINE TYPE [v1] References: 5.7.2 5.4.17 D.4.6.2	Same as Model Profile ☐ Element: Required ☐ Permitted ☒ Prohibited ☐ Select 1 or more of the following: ☒ ***values 1..5: solid(1), dashed (2), dotted (3), dash-dot (4), dash-dot-dot (5)*** ☐ subset of registered values (attach list): ☐ profile-defined values (attach complete description): For [v3] metafiles, ☐ Negative values assigned by the LINE AND EDGE TYPE DEFINITION element. Other: ***By default line type will be solid if not specified***.	Same as Model Profile ☐ Element: Required ☐ Permitted ☒ Prohibited ☐ Select 1 or more of the following: ☒ values 1..5: ☐ subset of registered values (attach list): ☐ profile-defined values (attach complete description): For [v3] metafiles, ☒ Negative values assigned by the LINE AND EDGE TYPE DEFINITION element. Other: *No*ne.
T.20.3 LINE WIDTH [v1] References: 5.7.3 D.4.6.3	Same as Model Profile ☐ Element: Required ☐ Permitted ☒ Prohibited ☐ Is value zero allowed? (yes/no) ***No*** If yes, specify its meaning. Any restrictions on the parameter value? ***Yes, 1 to 100 pixels.*** Other:	Same as Model Profile ☐ Element: Required ☐ Permitted ☒ Prohibited ☐ Is value zero allowed? (yes/no) *Yes.* If yes, specify its meaning. *Minimum available line width.* Any restrictions on the parameter value? *None.* Other: *None.*
T.20.4 LINE COLOUR [v1] References: 5.7.4 7.5.4.1 T.14.1	Same as Model Profile ☐ Element: Required ☐ Permitted ☒ Prohibited ☐ The line colour specifier parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Any restrictions on the parameter value? ***RGB only.*** Other: ***By default Line Colour will be device dependent foreground colour if not specified***.	Same as Model Profile ☐ Element: Required ☐ Permitted ☒ Prohibited ☐ The line colour specifier parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Any restrictions on the parameter value? *No*ne. Other: *No*ne.
T.20.5 MARKER BUNDLE INDEX [v1] References: 5.7.5 7.5.4.2 T.17.12 D.4.6.1	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ The line bundle index parameter shall follow the rules for indexes, clause 7.5.4.2. For [v1] metafiles, allowable index values: For [v2/3] metafiles, any referenced bundle shall have an explicit representation definition. Other:	Same as Model Profile ☐ Element: Required ☐ Permitted ☒ Prohibited ☐ The line bundle index parameter shall follow the rules for indexes, clause 7.5.4.2. For [v1] metafiles, allowable index values: *1..5.* *Index* 1 2 3 4 5 *line type* 1 2 3 4 5 *line width* 1.0 1.0 1.0 1.0 1.0 *line colour* 1 1 1 1 1 For [v2/3] metafiles, any referenced bundle shall have an explicit representation definition. Other: *None.*

Table 20 - Attribute elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.20.6 MARKER TYPE [v1] References: 5.7.6 D.4.6.4	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Indicate one or more of the following restrictions: ☐ values 1..5: ☐ subset of registered values (attach list): ☐ profile-defined values (attach complete description): Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Indicate one or more of the following restrictions: ☒ values 1..5: ☐ subset of registered values (attach list): ☐ profile-defined values (attach complete description): Other: *No*ne.
T.20.7 MARKER SIZE [v1] References: 5.7.7 D.4.6.5	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Is value zero allowed? (yes/no) If yes, specify its meaning. Any restrictions on the parameter value? Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Is value zero allowed? (yes/no) *Yes.* If yes, specify its meaning. *Minimum available size.* Any restrictions on the parameter value? *None.* Other: *None.*
T.20.8 MARKER COLOUR [v1] References: 5.7.8 7.5.4.1 T.14.1	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ The marker colour specifier parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Any restrictions on the parameter value? Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ The marker colour specifier parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Any restrictions on the parameter value? *No*ne. Other: *No*ne.
T.20.9 TEXT BUNDLE INDEX [v1] References: 5.7.9 7.5.4.2 T.17.13 D.4.6.1	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ The marker colour specifier parameter shall follow the rules for indexes, clause 7.5.4.2. For [v1] metafiles, allowable index values: For [v 2/3] metafiles, any referenced bundle shall have an explicit representation definition. Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ The marker colour specifier parameter shall follow the rules for indexes, clause 7.5.4.2. For [v1] metafiles, allowable index values: *1.2.* *Index* *1* *2* *font index* *1* *1* *text precision* *stroke* *stroke* *character expansion factor* *1.0* *1.0* *character spacing* *0.0* *0.0* *text colour* *1* *1* For [v 2/3] metafiles, any referenced bundle shall have an explicit representation definition. Other: *None.*
T.20.10 TEXT FONT INDEX [v1] References: 5.7.10 7.5.4.2 T.16.13	Same as Model Profile ☐ Element: Required ☐ Permitted ☒ Prohibited ☐ Every referenced index shall refer to an entry in the FONT LIST (see T.16.13). Other: ***When not present, treat as if index=1***.	Element: Required ☐ Permitted ☒ Prohibited ☐ Every referenced index shall refer to an entry in the FONT LIST (see T.16.13). Other: *No*ne.

Table 20 - Attribute elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.20.11 TEXT PRECISION [v1] References: 5.7.11	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? ***String only.*** Other: ***Since this profile only specifies a single value or option, this element although permitted, never needs to appear in a compliant metafile. If element is included, only allowed representation is String. See Table I of this profile.***	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *None.* Other: *None.*
T.20.12 CHARACTER EXPANSION FACTOR [v1] References: 5.7.12	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Is value zero allowed? (yes/no) ***No.*** If yes, state the meaning. Any restrictions on the parameter value? ***1.0 only.*** Other: ***Since this profile only specifies a single value or option, this element although permitted, never needs to appear in a compliant metafile. If element is included, only allowed value is 1.0. See Table I of this profile.***	Element is: Required ☐ Permitted ☒ Prohibited ☐ Is value zero allowed? (yes/no) *No.* If yes, state the meaning. Any restrictions on the parameter value? *Values shall be restricted to the range 0.1..10.0.* Other: *None.*
T.20.13 CHARACTER SPACING [v1] References: 5.7.13	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? ***0.0 only.*** Other: ***Since this profile only specifies a single value or option, this element although permitted, never needs to appear in a compliant metafile. If element is included, only allowed value is 0.0. See Table I of this profile.***	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *Values shall be restricted to the range of -1.0..5.0.* Other: *None.*
T.20.14 TEXT COLOUR [v1] References: 5.7.14 7.5.4.1 T.14.1	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ The *text colour specifier* parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Any restrictions on the parameter value? ***RGB only.*** Other: ***By default Text Colour will be device dependent foreground colour unless specified***.	Element is: Required ☐ Permitted ☒ Prohibited ☐ The *text colour specifier* parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Any restrictions on the parameter value? *None.* Other: *None.*
T.20.15 CHARACTER HEIGHT [v1] References: 5.7.15 D.4.6.9	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Is zero height allowed? (yes/no) ***No.*** If yes, state the meaning. Any restrictions on the parameter value? ***Interpret CGM implementation shall at least support character heights within the range of 6 through 72. However, not all values within the range need be supported.*** ***Generate CGM implementations shall output Character Height element with a value no less than 6. No constraint on the upper limit value.*** Other: ***Unsupported character heights will be substituted. Substituted heights shall be the next lowest supported value for the font.***	Element is: Required ☐ Permitted ☒ Prohibited ☐ Is zero height allowed? *Yes.* If yes, state the meaning. *Minimum available height.* Any restrictions on the parameter value? *None.* Other: *None.*

Table 20 - Attribute elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.20.16 CHARACTER ORIENTATION [v1] References: 5.7.16 D.4.6.10	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the following distortion aspects? ***Yes.*** rotation? ***Not allowed.*** skewing? ***Not allowed.*** mirroring? ***Not allowed.*** aspect ratio? ***Not allowed.*** Other: ***When VDC Extent element with x increasing right and y increasing up (x1<x2 and y1<y2). Character Orientation element not required or Y= 1 and X = 1 when Character Orientation present.*** ***When VDC Extent element with x increasing right and y increasing down x1<x2 and y1>y2). Character Orientation element not required or Y= -1 and X = 1 when Character Orientation present.*** ***When VDC Extent element with x increasing left and y increasing up (x1>x2 and y1<y2). Character Orientation element not required or Y=1 and X = -1 when Character Orientation present.*** ***When VDC Extent element with x increasing left and y increasing down (x1>x2 and y1>y2). Character Orientation element not required or Y= -1 and X = -1 when Character Orientation present.*** ***By default the Character Orientation will be 0, 1, 1, 0.***	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the following distortion aspects? rotation? *None.* skewing? *None.* mirroring? *None.* aspect ratio? *None.* Other: *None.*
T.20.17 TEXT PATH [v1] References: 5.7.17 D.4.6.11	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? ***Right only.*** Other: ***Since this profile only specifies a single value or option, this element although permitted, never needs to appear in a compliant metafile. If element is included, only allowed representation is Right. See Table I of this profile.***	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *None.* Other: *None.*
T.20.18 TEXT ALIGNMENT [v1] References: 5.7.18 D.4.6.12	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the horizontal and vertical alignment values? ***Normal horizontal and vertical only.*** Any restrictions on the continuous horizontal and vertical alignment values? ***None.*** Other: ***Since this profile only specifies a single value or option, this element although permitted, never needs to appear in a compliant metafile. If element is included, only allowed representation is normal horizontal and vertical. See Table I of this profile.***	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any retractions on the horizontal and vertical alignment values? *None.* Any restrictions on the continuous horizontal and vertical alignment values? *None.* Other: *None.*
T.20.19 CHARACTER SET INDEX [v1] References: 5.7.19 D.4.6.13 7.5.4.2 T.16.14 T.16.22	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Every referenced index shall refer to an entry in the CHARACTER SET LIST or GLYPH MAPPING. This includes implicit reference to the default index value. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Every referenced index shall refer to an entry in the CHARACTER SET LIST or GLYPH MAPPING. This includes implicit reference to the default index value. Other: *None.*

Table 20 - Attribute elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.20.20 ALTERNATE CHARACTER SET INDEX [v1] References: 5.7.20 7.5.4.2 T.16.14 D.4.6.13 T.16.22	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Every referenced index shall refer to an entry in the CHARACTER SET LIST or GLYPH MAPPING. This includes implicit reference to the default index value. Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Every referenced index shall refer to an entry in the CHARACTER SET LIST or GLYPH MAPPING. This includes implicit reference to the default index value. Other: *None.*
T.20.21 FILL BUNDLE INDEX [v1] References: 5.7.21 7.5.4.2 T.17.14 D.4.6.1	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ The *fill bundle index* parameter shall follow the rules for indexes, clause 7.5.4.2. For [v1] metafiles, allowable index values: For [v2/3] metafiles, any referenced bundle shall have an explicit representation definition. Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ The *fill bundle index* parameter shall follow the rules for indexes, clause 7.5.4.2. For [v1] metafiles, allowable index values: *1..5.* *Index* 1 2 3 4 5 *Interior style* hatch hatch hatch hatch hatch *Fill colour* 1 1 1 1 1 *Hatch index* 1 2 3 4 5 *Pattern index* 1 1 1 1 1 For [v2/3] metafiles, any referenced bundle shall have an explicit representation definition. Other: *No*ne.
T.20.22 INTERIOR STYLE [v1] References: 5.7.22 D.4.6.15	Same as Model Profile ☐ Element: Required ☐ Permitted ☒ Prohibited ☐ For 'hollow' interior style, line type and width of the bounding line: ***Same as model profile.*** Any restrictions on the parameter value? ***Filled –area primitives must support the Interior Style parameter for solid (1), hatch (3), and empty (4).*** Other: ***The interior style will default to hollow unless it is specified otherwise in the CGM file***.	Element: Required ☐ Permitted ☒ Prohibited ☐ For 'hollow' interior style, line type and width of the bounding line: *Solid line type and default line width.* Any restrictions on the parameter value? *None.* Other: *None.*
T.20.23 FILL COLOUR [v1] References: 5.7.23 7.5.4.1 T.14.1	Same as Model Profile ☐ Element: Required ☐ Permitted ☒ Prohibited ☐ The *fill colour specifier* parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Any restrictions on the parameter value? ***8 bit RGB only.*** Other: ***When this attribute is not included, then fill colour should default to the device dependent foreground colour.***	Element: Required ☐ Permitted ☒ Prohibited ☐ The *fill colour specifier* parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Any restrictions on the parameter value? *None.* Other: *No*ne.

Table 20 - Attribute elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.20.24 HATCH INDEX [v1] References: 5.4.18 D.4.6.16 5.7.24 5.7.4.2	Same as Model Profile ☐ Element: Required ☐ Permitted ☒ Prohibited ☐ Select 1 or more of the following: ☒ values 1..6: ***horizontal (1), vertical (2), positive slope (3), negative slope (3), horizontal/vertical crosshatch (5) and positive/negative slope cross (6).*** ☐ subset of registered values (attach list): ☐ profile-defined values (attach complete description): For [v3] metafiles: ☐ negative values assigned by the HATCH STYLE DEFINITION elements. Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Select 1 or more of the following: ☒ values 1..6: ☐ subset of registered values (attach list): ☐ profile-defined values (attach complete description): For [v3] metafiles: ☒ negative values assigned by the HATCH STYLE DEFINITION elements. Other: *None.*
T.20.25 PATTERN INDEX [v1] References: 5.7.25 7.5.4.2	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ The *pattern index* parameter shall follow the rules for indexes, clause 7.5.4.2. Any restrictions on the parameter value? Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ The *pattern index* parameter shall follow the rules for indexes, clause 7.5.4.2. Any restrictions on the parameter value? *None.* Other: *No*ne.
T.20.26 EDGE BUNDLE INDEX [v1] References: 5.7.26 D.4.6.1 T.17.15 5.7.4.2	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ The edge bundle index parameter shall follow the rules for indexes, clause 7.5.4.2. For [v1] metafiles, allowable index values: For [v2/3] metafiles, any referenced bundle shall have an explicit representation definition. Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ The edge bundle index parameter shall follow the rules for indexes, clause 7.5.4.2. For [v1] metafiles, allowable index values: *1..5.* *index* 1 2 3 4 5 *edge type* 1 2 3 4 5 *edge width* 1.0 1.0 1.0 1.0 1.0 *edge colour* 1 1 1 1 1 For [v2/3] metafiles, any referenced bundle shall have an explicit representation definition. Other: *None.*
T.20.27 EDGE TYPE [v1] References: 5.4.17 7.7.27 D.4.6.17	Same as Model Profile ☐ Element: Required ☐ Permitted ☒ Prohibited ☐ Select 1 or more of the following: ☒ values 1..5 ☐ subset of registered values (attach list): ☐ profile-defined values (attach complete description): For [v3] metafiles: ☐ negative values assigned by the LINE AND EDGE TYPE DEFINITION element. Other: ***By default Edge Type will be Solid unless it is specified in the CGM file.***	Element: Required ☐ Permitted ☒ Prohibited ☐ Select 1 or more of the following: ☒ values 1..5: ☐ subset of registered values (attach list): ☐ profile-defined values (attach complete description): For [v3] metafiles: ☒ negative values assigned by the LINE AND EDGE TYPE DEFINITION element. Other: *No*ne.

Table 20 - Attribute elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.20.28 EDGE WIDTH [v1] References: 5.7.28 D.4.6.18	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Is value zero allowed? (yes/no) ***No.*** If yes, specify its meaning. Any restrictions on the parameter value? ***Yes, 1 - 100*** Other: ***None***	Element is: Required ☐ Permitted ☒ Prohibited ☐ Is value zero allowed? (yes/no) *Yes.* If yes, specify its meaning. *Minimum available edge width.* Any restrictions on the parameter value? *None.* Other: *None.*
T.20.29 EDGE COLOUR [v1] References: 5.7.29 7.5.4.1 T.14.1	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ The edge colour specifier parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Any restrictions on the parameter value? ***RGB only.*** Other: ***When this attribute is not included in the metafile the Edge Colour shall default to the device dependent foreground colour*** .	Element is: Required ☐ Permitted ☒ Prohibited ☐ The edge colour specifier parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Any restrictions on the parameter value? *None.* Other: *None.*
T.20.30 EDGE VISIBILITY [v1] References: 5.7.30	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Prohibited ☐ Any restrictions on the parameter value? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *None.* Other: *None.*
T.20.31 FILL REFERENCE POINT [v1] References: 5.7.31	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter value? Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *None.* Other: *None.*
T.20.32 PATTERN TABLE [v1] References: 5.7.32	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Maximum size for nx: Allowable values for nx: Maximum size for ny: Allowable values for ny: Any restrictions on the number of pattern definitions? Any restrictions on allowable combinations of nx and ny? Any restrictions on the number of colours? Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Maximum size for nx: *32.* Allowable values for nx: *8, 16, or 32.* Maximum size for ny: *32.* Allowable values for ny: *8, 16, or 32.* Any restrictions on the number of pattern definitions? *64.* Any restrictions on allowable combinations of nx and ny? *None.* Any restrictions on the number of colours? *None.* Other: *No*ne.
T.20.33 PATTERN SIZE [v1] References: 5.7.33 D.4.6.19	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Must pattern vectors be parallel to coordinate axes? (yes/no) If no, state of ther meaning of skewed or non-aligned patterns. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Must pattern vectors be parallel to coordinate axes? (yes/no) *No.* If no, state the meaning of skewed or non-aligned patterns. Other:

Table 20 - Attribute elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.20.34 COLOUR TABLE [v1] References: 5.7.34 7.5.4.1 T.14.1	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any limits on the length of colour list? Any restrictions on the index values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any limits on the length of colour list? *Monochrome:2, Greyscale:64, Colour:256.* Any restrictions on the index values? *Index values shall not exceed the maximum colour index.* Other: *None.*
T.20.35 ASPECT SOURCE FLAGS [v1] References: 5.7.35 D.4.6.20	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Are all ASF values to be the same: for the metafile? (yes/no) within each class (line, marker, text, fill, edge) of primitive? (yes/no) Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Are all ASF values to be the same: for the metafile? (yes/no) *No.* within each class (line, marker, text, fill, edge) of primitive? (yes/no) *Yes.* Other: *None.*
T.20.36 PICK IDENTIFIER [v2] References: 5.7.36	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter value? Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *None.* Other: *None.*
T.20.37 LINE CAP [v3] References: 5.7.37 7.5.7.5 T.25.7	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the set of values for the line cap indicator? (choose 1 or both) ☐ values 1..5: ☐ subset of registered values (attach list): Any restrictions on the set of values for the dash cap indicator? (choose 1 or both) ☐ values 1..3: ☐ subset of registered values (attach list): Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the set of values for the line cap indicator? (choose 1 or both) ☒ values 1..5: ☐ subset of registered values (attach list): Any restrictions on the set of values for the dash cap indicator? (choose 1 or both) ☒ values 1..3: ☐ subset of registered values (attach list): Other: *No*ne.
T.20.38 LINE JOIN [v3] References: 5.7.38 7.5.7.5 T.25.7	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the set of values? (choose 1 or both) ☐ values 1..4: ☐ subset of registered values (attach list): Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the set of values? (choose 1 or both) ☒ values 1..4: ☐ subset of registered values (attach list): Other: *None.*

Table 20 - Attribute elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.20.39 LINE TYPE CONTINUATION [v3] References: 5.7.39 7.5.7.5 T.25.7	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the set of values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the set of values? *1..4.* Other: *None.*
T.20.40 LINE TYPE INITIAL OFFSET [v3] References: 5.7.40	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter value? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *None.* Other: *None.*
T.20.41 TEXT SOURCE TYPE [v3] References: 5.7.41	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the set of values? (choose 1 or both) ☐ values 1..4: ☐ subset of registered values (attach list): Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the set of values? (choose 1 or both) ☒ values 1..4: ☐ subset of registered values (attach list): Other: *None.*
T.20.42 RESTRICTED TEXT TYPE [v3] References: 5.7.42 7.5.7.5 T.25.7	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the set of values? (choose 1 or both) ☐ values 1..6: ☐ subset of registered values (attach list): Algorithms for achieving restriction type? (attach) Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the set of values? (choose 1 or both) ☒ values 1..6: ☐ subset of registered values (attach list): Algorithms for achieving restriction type? (attach) *Not specified.* Other: *No*ne.
T.20.43 INTERPOLATED INTERIOR [v3] References: 5.7.43	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Any limits on the number of stages? Any restrictions on the set of values? (choose 1 or both) ☐ values 1..3: ☐ subset of registered values (attach list): Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Any limits on the number of stages? *M*aximum number of stages is 8. Any restrictions on the set of values? (choose 1 or both) ☒ values 1..3: ☐ subset of registered values (attach list): Other: *None.*

Table 20 - Attribute elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.20.44 EDGE CAP [v3] References: 5.7.44 7.5.7.5 T.25.7	Same as Model Profile ☐ Element: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the set of values for the edge cap indicator? (choose 1 or both) ☐ values 1..5: ☐ subset of registered values (attach list): Any restrictions on the set of values for the dash cap indicator? (choose 1 or both) ☐ values 1..3: ☐ subset of registered values (attach list): Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the set of values for the edge cap indicator? (choose 1 or both) ☒ values 1..5: ☐ subset of registered values (attach list): Any restrictions on the set of values for the dash cap indicator? (choose 1 or both) ☒ values 1..3: ☐ subset of registered values (attach list): Other: *No*ne.
T.20.45 EDGE JOIN [v3] References: 5.7.45 7.5.7.5 T.25.7	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the set of values? (choose 1 or both) ☐ values 1..4: ☐ subset of registered values (attach list): Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the set of values? (choose 1 or both) ☒ values 1..4: ☐ subset of registered values (attach list): Other: *None.*
T.20.46 EDGE TYPE CONTINUATION [v3] References: 5.7.46 7.5.7.5 T.25.7	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the set of values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the set of values? *1..4.* Other: *None.*
T.20.47 EDGE TYPE INITIAL OFFSET [v3] References: 5.7.47	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter value? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *None.* Other: *None.*
T.20.48 SYMBOL LIBRARY INDEX [v3] References: 5.7.48 7.5.4.2 T.16.23	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Prohibited ☐ Every referenced index shall refer to an entry in the SYMBOL LIBRARY LIST (see T.16.23). Other:	Element is: Required ☐ Permitted ☐ Prohibited ☒ Every referenced index shall refer to an entry in the SYMBOL LIBRARY LIST (see T.16.23). Other: *This element is prohibited because SYMBOL LIBRARY LIST is prohibited.*

Table 20 - Attribute elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.20.49 SYMBOL COLOUR [v3] References: 5.7.49 7.5.4.1 T.14.1 T.16.23 D.4.6.21	Same as Model Profile ☒	
	Element is: Required ☐ Permitted ☐ Prohibited ☐ The *symbol colour specifier* parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Any restrictions on the parameter value? Other:	Element is: Required ☐ Permitted ☐ Prohibited ☒ The *symbol colour specifier* parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Any restrictions on the parameter value? Other: *This element is prohibited because SYMBOL LIBRARY LIST is prohibited.*
T.20.50 SYMBOL SIZE [v3] References: 5.7.50 T.16.23	Same as Model Profile ☒	
	Element is: Required ☐ Permitted ☐ Prohibited ☐ Is value zero allowed: (yes/no) If yes, specify its meaning. Any restrictions on the parameter value? Other:	Element is: Required ☐ Permitted ☐ Prohibited ☒ Is value zero allowed: (yes/no) If yes, specify its meaning. Any restrictions on the parameter value? Other: *This element is prohibited because SYMBOL LIBRARY LIST is prohibited.*
T.20.51 SYMBOL ORIENTATION [v3] References: 5.7.51 T.16.23 D.4.6	Same as Model Profile ☒	
	Element is: Required ☐ Permitted ☐ Prohibited ☐ Any restrictions on rotation? Any restrictions on skewing? Any restrictions on mirroring? Any restrictions on distortion of aspect ratio? Other:	Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on rotation? Any restrictions on skewing? Any restrictions on mirroring? Any restrictions on distortion of aspect ratio? Other: *This element is prohibited because SYMBOL LIBRARY LIST is prohibited.*

Table 21 - Escape elements

Element	Specifications - PPF	Specifications - Model Profile
T.21.1 ESCAPE [v1] References: 5.8.1	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ List all registered ESCAPEs that are allowed: List all profile-defined ESCAPEs that are allowed and attach complete description: ***NOTE - Only registered ESCAPEs and profile-defined ESCAPEs shall be allowed in profiles.*** Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ List all registered ESCAPEs that are allowed: *ESCAPE 22, Transparent Cell Colour [v1/v2] metafiles only.* List all profile-defined ESCAPEs that are allowed and attach complete description: *None.* Other: *None.*

Table 22 - External elements

Element	Specifications - PPF	Specifications - Model Profile
T.22.1 MESSAGE [v1] References: 5.9.1	Same as Model Profile ☐	
	Element: Required ☐ Permitted ☐ Prohibited ☒ Values of the *action required flag* parameter: 'action' Permitted ☐ Prohibited ☐ (If permitted, specify the messages and actions taken) 'no action' Permitted ☐ Prohibited ☐ Any restrictions on the length of the message string, other than those for type SF parameter? Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ Values of the *action required flag* parameter: 'action' Permitted ☐ Prohibited ☒ (If permitted, specify the messages and actions taken) 'no action' Permitted ☒ Prohibited ☐ Any restrictions on the length of the message string, other than those for type SF parameter? *None.* Other: *None.*
T.22.1 APPLICATION DATA [v1] References: 5.9.2	Same as Model Profile ☐	
	Element: Required ☐ Permitted ☐ Prohibited ☒ The use of this element shall not be restricted. Attach a syntactic and semantic description of all application data elements associated with this profile. Other:	Element: Required ☐ Permitted ☒ Prohibited ☐ The use of this element shall not be restricted. Attach a syntactic and semantic description of all application data elements associated with this profile. Other: *No*ne.

Table 23 - Segment elements

Element	Specifications - PPF	Specifications - Model Profile
T.23.1 COPY SEGMENT [v2] References: 5.10.1 D.4.9.2	Same as Model Profile ☒	
	Element is: Required ☐ Permitted ☐ Prohibited ☐ Every segment identifier shall refer to a defined segment. Any limits on the segment transformation application value? Any restrictions on the nature of the transformation (e.g., permitting only isotropic transformations)? Other:	Element is: Required ☐ Permitted ☐ Prohibited ☒ Every segment identifier shall refer to a defined segment. Any limits on the segment transformation application value? *None.* Any restrictions on the nature of the transformation (e.g., permitting only isotropic transformations)? *Non-singular.* Other: *None.*
T.23.2 INHERITANCE FILTER [v2] References: 5.10.2	Same as Model Profile ☒	
	Element is: Required ☐ Permitted ☐ Prohibited ☐ Any limits on the filter selection list? Any limits on the selection setting? Other:	Element is: Required ☐ Permitted ☐ Prohibited ☒ Any limits on the filter selection list? *None.* Any limits on the selection setting? *None.* Other: *None.*

Table 23 - Segment elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.23.3 CLIP INHERITANCE [v2] References: 5.10.3 D.4.9.2	Same as Model Profile ☒	
	Element is: Required ☐ Permitted ☐ Prohibited ☐ Any limits on the parameter? Other:	Element is: Required ☐ Permitted ☐ Prohibited ☒ Any limits on the parameter? *None.* Other: *None.*
T.23.4 SEGMENT TRANSFORMATION [v2] References: 5.10.4	Same as Model Profile ☒	
	Element is: Required ☐ Permitted ☐ Prohibited ☐ Any restrictions on the nature of the transformation (e.g., permitting only isotropic transformations)? Other:	Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the nature of the transformation (e.g., permitting only isotropic transformations)? *Non-singular.* Other: *None.*
T.23.5 SEGMENT HIGHLIGHTING [v2] References: 5.10.5	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter values? *None* Other: *None.*
T.23.6 SEGMENT DISPLAY PRIORITY [v2] References: 5.10.6	Same as Model Profile ☒	
	Element is: Required ☐ Permitted ☐ Prohibited ☐ Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter values? *None* Other: *None.*
T.23.7 SEGMENT PICK PRIORITY [v2] References: 5.10.7	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter values? *None.* Other: *None.*

Table 24 - Generator implementation requirements

Functionality	Specifications - PPF	Specifications - Model Profile

T.24.1 Colour requirements References: 5.5.4.1 7.5.6.2.1	Same as Model Profile ☒	
	Element: Permitted ☐ Prohibited ☐	Element: Permitted ☒ Prohibited ☐
	Reduction of the number of colours?	Reduction of the number of colours? *Not specified.* *NOTE - If mapping of application colours to metafile colour specification is required. It is recommended that colour distance in the mapping be computed by the Euclideon metric in CIEXYZ space.*
	Definition of mapping algorithms, metrics, and colour space?	Definition of mapping algorithms, metrics, and colour space? *No specific colour mapping techniques or selection of metafile colour sets are defined.*
	For [v1/v2] metafiles, implicit colour calibration specification?	For [v1/v2] metafiles, implicit colour calibration specification? *No specifications are defined.*
	Other:	Other: *None.*

Table 24 - Generator implementation requirements (continued)

Functionality	Specifications - PPF	Specifications - Model Profile
T.24.2 Geometric accuracy and latitude References: 7.5.6.2	Same as Model Profile ☒	
	Accuracy and latitude for mapping application graphics to CGM graphical primitive elements:	Accuracy and latitude for mapping application graphics to CGM graphical primitive elements: *Generators shall produce a metafile whose graphical primitive elements match the application graphical primitives accurately to within 0.1% of relative position within the VDC Extent box or 1/2 pixel of the intended size, whichever is greater.* *This requirement shall apply to all graphical primitive elements, unless superseded by specific element requirements in this clause.*
T.24.3 Text accuracy and latitude References: 7.5.6.2.4	Same as Model Profile ☒	
	Is text accuracy and latitude addressed? (yes/no) If yes, specify.	Is text accuracy and latitude addressed? (yes/no) *Yes.* If yes, specify. *Metafile text specifications shall match the text of the application picture to within 1% of relative to the intended size or 1/2 pixel of the intended size, whichever is greater, for the placement and overall extent of each text string.*
T.24.4 Font substitution References: 7.5.6.2.5 annex H	Same as Model Profile ☒	
	Font substitution is: Permitted ☐ Prohibited ☐ Similarity of font visual characteristics? Font metrics? Individual glyph metrics? Other:	Font substitution is: Permitted ☒ Prohibited ☐ Similarity of font visual characteristics? *Substituted fonts shall have similar visual characteristics (e.g., posture, weight, proportionate width).* Font metrics? *Specified in annex H.* Individual glyph metrics? *Specified in annex H.* Other: *None.*
T.24.5 Preservation of primitives References: 7.5.6.3	Same as Model Profile ☒	
	Is preservation of graphical primitive elements addressed? (yes/no) If yes, specify allowable substitutions.	Is preservation of graphical primitive elements addressed? (yes/no) *No.* If yes, specify allowable substitutions.
T.24.6 Semantic latitude References: 7.5.6.4	Same as Model Profile ☒	
	Drawing priority and mode: Clipping: Edge centering: Meaning of predefined line types and edge types: Meaning of predefined hatch styles: Other: *None.*	Drawing priority and mode: *Priority shall correspond to the metafile order (i.e., primitives occurring later in the file shall overlay primitives occurring earliest in the file). Mode shall be "replacement mode".* Clipping: *Clipping shall be to the intersection of the clip rectangle, the VDC EXTENT, the device viewport, and the device view surface limits.* Edge centering: *Edges shall be centered on the ideal mathematically-defined edge of the area.* Meaning of predefined line types and edge types: *The exact on-off definitions for the predefined line types and edge types are not specified.* Meaning of predefined hatch styles: *The inter-line spacing is not specified. Use the latitudes of annex D4.6.16 for the angular directions.* Other: *None.*
T.24.7 Error processing References: 7.5.6.5	Same as Model Profile ☒	
	Is error processing addressed? (yes/no) If yes, specify the action taken. Classification of error severity? Requirements for error recovery? Requirements for error reporting? Additional areas? Other:	Is error processing addressed? (yes/no) *No.* If yes, specify the action taken. Classification of error severity? Requirements for error recovery? Requirements for error reporting? Additional areas? Other: *None.*

Table 24 - Generator implementation requirements (continued)

Functionality	Specifications - PPF	Specifications - Model Profile
T.24.8	Same as Model Profile ☒	
Reporting References: 7.5.6.6	Is reporting required? (yes/no) No. If yes, specify action taken. Method and format of the reporting? Requirement to report substitution, error, fallback behavior, mappings, or other behaviors? Additional areas? Other: None.	Is reporting required? (yes/no) *No.* If yes, specify action taken. Method and format of the reporting? Requirement to report substitution, error, fallback behavior, mappings, or other behaviors? Additional areas? Other: *None.*
T.24.9	Same as Model Profile ☐	
Degeneracies References: 7.5.6.7 7.5.4.4 D.2 D.4	Is the generation of degenerate primitives addressed? (yes/no) ***Yes.*** If yes, attach specifications. ***The CGM implementation for BPCGM is precluded from generating and outputting degenerate CGM elements.*** Other:	Is the generation of degenerate primitives addressed? (yes/no) *No. The generation of degenerate primitives is not restricted.* If yes, attach specifications Other: *None.*

Table 25 - Interpreter implementation requirements

Functionality	Specifications - PPF	Specifications - Model Profile
T.25.1	Same as Model Profile ☒	
Number of pictures References: 7.5.7.2 T.13.2	If 0 pictures are permitted (see T.13.2), describe the interpreter behavior:	If 0 pictures are permitted (see T.13.2), describe the interpreter behavior: *Prohibited by T.13.2.*
T.25.2	Same as Model Profile ☒	
Empty pictures References: 7.5.7.3 T.13.3	If permitted (see T.13.3), interpreter behavior:	If permitted (see T.13.3), interpreter behavior: *The graphical effect shall be one picture in the background colour.*
T.25.3	Same as Model Profile ☐	
Colour requirements References: 7.5.4.1 7.5.7.4.1 7.5.4.5	Interpreters shall be classified as either monochrome, greyscale, or colour interpreters (depending on the colour capability of the interpreter), and shall meet the criteria in attachment 25.4. ***BIIF CGM files are 24 bit RGB colour only, it is up to greyscale system to convert the RGB to greyscale in accordance with:*** ***For eight-bit greyscale systems:*** ***pixel value$_8$ = 0.299*RED + 0.587*GREEN + 0.114*BLUE*** ***For one bit black and white systems:*** ***pixel value$_1$ = 1 (white), if pixel value$_8$> 127*** ***0 (black), if pixel value$_8$<= 127*** Conversions between different colour models shall be according to the conversions in annex G. ***Not applicable.*** Mapping of metafile colour to device components? ***Colour items for receiving systems unable to support full Colour must be mapped to Colours the are able to support.*** For [v1/2] metafiles, implicit colour calibration specifications? ***No.*** Other: ***None***.	Interpreters shall be classified as either monochrome, greyscale, or colour interpreters (depending on the colour capability of the interpreter), and shall meet the criteria in attachment 25.4. Conversions between different colour models shall be according to the conversions in annex G. Mapping of metafile colour to device components? *If mapping (to fewer colour, or greyscale, or monochrome) is required for RGB metafiles, the recommendations of annex D.3.2 shall be used.* For [v1/2] metafiles, implicit colour calibration specifications? *No specifications are defined.* Other: *None.*

Table 25 - Interpreter implementation requirements (continued)

Functionality	Specifications - PPF	Specifications - Model Profile
T.24.4 Geometric accuracy and latitude References: 7.5.7.4.2	Same as Model Profile ☒	
	Accuracy and latitude for placement and realization of geometric aspects when geometric primitive elements are rendered.	Accuracy and latitude for placement and realization of geometric aspects when geometric primitive elements are rendered. *Interpreters shall render graphical primitive elements accurately to within 0.1% of relative position within the VDC Extent box or 1/2 of the pixel resolution of the output device, whichever is greater. Interpreters shall render the geometric size aspect of primitives (e.g., text size, line width, and edge width) to within 1% of the intended size or 1/2 pixel of resolution of the output device, whichever is greater.* *This requirement shall apply to all graphical primitive elements, unless superseded by specific element requirements in this clause.*
T.25.5 Text rendering References: 7.5.7.4.3 T.25.3	Same as Model Profile ☒	
	Is text accuracy and latitude addressed? (yes/no) If yes, specify. Is precision of text rendering addressed? (yes/no) If yes, specify interpreteraction.	Is text accuracy and latitude addressed? (yes/no) *Yes.* If yes, specify. *Interpreter-rendered text shall match the text specification of the metafile to within 1% relative to the intended size or 1/2 pixel of resolution of the output device, whichever is greater, for the placement and overall extent of each text string.* Is precision of text rendering addressed? (yes/no) *Yes.* If yes, specify interpreteraction. *Interpreters shall render text using 'stroke' precision, regardless of the actual value of the TEXT PRECISION of the metafile.*
T.25.6 Font substitution References: 7.5.7.4.4 T.16.13 annex H	Same as Model Profile ☐	
	Font substitution is: Permitted ☒ Prohibited ☐ If prohibited, use the font as specified in the FONT LIST. If permitted, include a reference set of font and glyph metrics which correspond to the canonical instances of the substitutable font. ***See attached font list, clause 6.*** Are substitution methods, latitudes, and constraints addressed? (yes/no) ***No.*** If yes, specify. Similarity of font visual characteristics? Font metrics? Individual glyph metrics? Additional areas? Other: ***BPCGM01.00 interpreters must support one or more of the (BPCGM01.00) supported fonts as identified in the attached font list. If an interpreter receives a font that it does not support it will substitute it with one of the fonts from the supported font list.***	Font substitution is: Permitted ☒ Prohibited ☐ If prohibited, use the font as specified in the FONT LIST. If permitted, include a reference set of font and glyph metrics which correspond to the canonical instances of the substitutable font. *See the FONT LIST element and annex H.* Are substitution methods, latitudes, and constraints addressed? (yes/no) *Yes.* If yes, specify. Similarity of font visual characteristics? *Substituted fonts shall have similar visual characteristics to the fonts specified in the metafile.* Font metrics? *Substituted fonts shall have similar metrics to the fonts specified in the metafile.* Individual glyph metrics? *As specified in annex H.* Additional areas? *None.* Other: *None.*

Table 25 - Interpreter implementation requirements (continued)

Functionality	Specifications - PPF	Specifications - Model Profile
T.25.7	Same as Model Profile ☐	
Semantic latitude References: 7.5.7.5 T.20.37 T.20.38 T.20.39 T.20.42 T.20.44 T.20.45 T.20.46	Drawing priority and mode: ***Same as model profile.***	Drawing priority and mode: *Priority shall correspond to the metafile order (i.e., primitives occurring later in the file shall overlay primitives occurring earliest in the file. Mode shall be "replacement" mode.*
	View surface clearing at picture start: ***The surface shall not be cleared when the Begin Picture Body occurs.*** ***Note - If the user of a BIIF File opts to move an overlay, or turn off the presentation of an overlay, the underlying displayable pixels will then become visible. This approach allows for the non-destructible nature of BIIF overlays as opposed to the 'burned in' approach where overlay pixel values are used to replace pixels values of the underlying image.***	View surface clearing at picture start: *Surface will be cleared upon the occurrence of BEGIN PICTURE BODY.*
	Clipping: ***Clipping is not supported.***	Clipping: *When CLIP INDICATOR is 'off', clipping shall be to the intersection of the device viewport and the device view surface limits. When CLIP INDICATOR is 'on', clipping shall be to the intersection of the clip rectangle, the VDC EXTENT, the device viewport, and the device view surface limits.*
	Edge centering: ***Same as model profile.***	Edge centering: *Edges shall be centered on the ideal mathematically-defined edge of the area.*
	Meaning of predefined line types and edge types: ***Same as model profile.***	Meaning of predefined line types and edge types: *The exact on-off definitions for the predefined line types and edge types are not specified.*
	Meaning of predefined hatch styles: ***Same as model profile.***	Meaning of predefined hatch styles: *The inter-line spacing is not specified. Use the latitudes of annex D.4.6.16 for the angular directions.*
	For [v1/2] metafiles, text restriction method for RESTRICTED TEXT elements, chosen from the set of standard and registered styles of the RESTRICTED TEXT TYPE element: ***Not Permitted by Table reference T.20.42.***	For [v1/2] metafiles, text restriction method for RESTRICTED TEXT elements, chosen from the set of standard and registered styles of the RESTRICTED TEXT TYPE element:
	For [v1/2] metafiles, interpreter treatment of the 2 aspects of line cap shall be either: ☐ In the style of one specific parameter value pair from the set of standard and registered values (excluding values 1) of the LINE CAP element. Values = ? ☐ In the style of any parameter value pair from the set of standard and registered values (excluding values 1) of the LINE CAP element. ***Not Permitted by Table reference T.20.37.***	For [v1/2] metafiles, interpreter treatment of the 2 aspects of line cap shall be either: ☐ In the style of one specific parameter value pair from the set of standard and registered values (excluding values 1) of the LINE CAP element. Values = ? ☒ In the style of any parameter value pair from the set of standard and registered values (excluding values 1) of the LINE CAP element.
	For [v1/2] metafiles, interpreter treatment of the 2 aspects of edge cap shall be either: ☐ In the style of one specific parameter value pair from the set of standard and registered values (excluding values 1) of the EDGE CAP element. Values = ? ☐ In the style of any parameter value pair from the set of standard and registered values (excluding values 1) of the EDGE CAP element. ***Not Permitted by Table reference T.20.44.***	For [v1/2] metafiles, interpreter treatment of the 2 aspects of edge cap shall be either: ☐ In the style of one specific parameter value pair from the set of standard and registered values (excluding values 1) of the EDGE CAP element. Values = ? ☒ In the style of any parameter value pair from the set of standard and registered values (excluding values 1) of the EDGE CAP element.
	For [v1/2] metafiles, interpreter treatment of the 2 aspects of line join shall be either: ☐ In the style of one specific parameter value pair from the set of standard and registered values (excluding values 1) of the LINE JOIN element. Values = ? ☐ In the style of any parameter value pair from the set of standard and registered values (excluding values 1) of the LINE JOIN element. ***Not Permitted by Table reference T.20.38.***	For [v1/2] metafiles, interpreter treatment of the 2 aspects of line join shall be either: ☐ In the style of one specific parameter value pair from the set of standard and registered values (excluding values 1) of the LINE JOIN element. Values = ? ☒ In the style of any parameter value pair from the set of standard and registered values (excluding values 1) of the LINE JOIN element.

Table 25 - Interpreter implementation requirements (continued)

Functionality	Specifications - PPF	Specifications - Model Profile
T.25.7 continued Semantic latitude	For [v1/2] metafiles, interpreter treatment of the 2 aspects of edge join shall be either: ☐ In the style of one specific parameter value pair from the set of standard and registered values (excluding values 1) of the EDGE JOIN element. Values = ? ☐ In the style of any parameter value pair from the set of standard and registered values (excluding values 1) of the EDGE JOIN element. ***Not Permitted by Table reference T.20.45***. For [v1/2] metafiles, interpreter treatment of the 2 aspects of line type continuation shall be either: ☐ In the style of one specific parameter value pair from the set of standard and registered values (excluding values 1) of the LINE TYPE CONTINUATION element. Values = ? ☐ In the style of any parameter value pair from the set of standard and registered values (excluding values 1) of the LINE TYPE CONTINUATION element. ***Not Permitted by Table reference T.20.39.*** For [v1/2] metafiles, interpreter treatment of the 2 aspects of edge type continuation shall be either: ☐ In the style of one specific parameter value pair from the set of standard and registered values (excluding values 1) of the EDGE TYPE CONTINUATION element. Values = ? ☐ In the style of any parameter value pair from the set of standard and registered values (excluding values 1) of the EDGE TYPE CONTINUATION element. ***Not Permitted by Table reference T.20.46.*** Other:	For [v1/2] metafiles, interpreter treatment of the 2 aspects of edge join shall be either: ☐ In the style of one specific parameter value pair from the set of standard and registered values (excluding values 1) of the EDGE JOIN element. Values = ? ☒ In the style of any parameter value pair from the set of standard and registered values (excluding values 1) of the EDGE JOIN element. For [v1/2] metafiles, interpreter treatment of the 2 aspects of line type continuation shall be either: ☐ In the style of one specific parameter value pair from the set of standard and registered values (excluding values 1) of the LINE TYPE CONTINUATION element. Values = ? ☒ In the style of any parameter value pair from the set of standard and registered values (excluding values 1) of the LINE TYPE CONTINUATION element. For [v1/2] metafiles, interpreter treatment of the 2 aspects of edge type continuation shall be either: ☐ In the style of one specific parameter value pair from the set of standard and registered values (excluding values 1) of the EDGE TYPE CONTINUATION element. Values = ? ☒ In the style of any parameter value pair from the set of standard and registered values (excluding values 1) of the EDGE TYPE CONTINUATION element. Other:
T.25.8 Error processing References: 7.5.7.6	Same as Model Profile ☐ Is error processing addressed? ***Yes*** If yes, specify the action taken. Classification of error severity? Requirements for error recovery? Requirements for error reporting? ***Yes*** Additional areas? Other:	[redacted] Is error processing addressed? (yes/no) *No.* If yes, specify the action taken. Classification of error severity? Requirements for error recovery? Requirements for error reporting? Additional areas? Other: *None.*
T.25.9 Reporting References: 7.5.7.7	Same as Model Profile ☐ Is reporting required? (yes/no) ***Yes.*** If yes, specify the action taken. Method and format of the reporting? ***Any method or format.*** Requirement to report any substitution, error, fallback behavior, mapping, or other behaviors? ***Yes. See clause 7.1.6*** Additional areas? ***No.*** Other: ***None.***	[redacted] Is reporting required? (yes/no) *No.* If yes, specify the action taken. Method and format of the reporting? Requirement to report any substitution, error, fallback behavior, mapping, or other behaviors? Additional areas? Other: *None.*

Table 25 - Interpreter implementation requirements (continued)

Functionality	Specifications - PPF	Specifications - Model Profile
T.25.10 Degeneracies References: 7.5.7.8 7.5.4.4 D.2 D.4	Same as Model Profile ☐ Is the interpretation of degeneracies primitive addressed? (yes/no) ***Yes*** If yes, for each primitive, specify the degeneracy including its source . Other: ***CGM implementations are precluded from generating and outputting degenerate CGM elements.***	[redacted] Is the interpretation of degeneracies primitive addressed? (yes/no) *Yes.* If yes, for each primitive, specify the degeneracy including its source . *Intrinsically degenerate primitives shall be rendered as specified in annex D subsections: D.2.2, D.2.3, D.4.5.4 through D.4.5.8, D.4.5.11, and D.4.5.12. Interpreters do detect computational degeneracies, they shall be rendered as specified in annex D subsections: D.2.2, D.2.3, D.4.5.4 through D.4.5.8, D.4.5.11 and D.4.5.12.* Other: *None.*
T.25.11 Transparency References: 5.5.3 5.5.4 T.18.4	Same as Model Profile ☐ If transparency permitted, specify: ***In this profile, default for transparency is set to on. However, if Auxiliary Colour is desired, transparency must be turned off. See Table I of this profile.***	[redacted] If transparency permitted, specify: *Interpreters shall implement the AUXILLIARY COLOUR and TRANSPARENCY elements as described in the 2nd and 3rd paragraphs of the description in 5.5.4.*

The following tables come from ISO/IEC 8632-3, Second edition 1992-10-01, AMENDMENT 1 1994-12-15

Part 3:

Binary encoding

AMENDMENT 1: Rules for profiles

Table 12 - Delimiter elements

Element	Specifications - PPF	Specifications - Model Profile
T.12.1 no-op [v1] References: 7.2	Same as Model Profile ☒	
	Element is: Required ☐ Permitted ☐ Any restrictions on the parameter value? Other:	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? *None.* Other: *None.*

Table 13 - Metafile descriptor elements

Element	Specifications - PPF	Specifications - Model Profile
T.13.1 INTEGER PRECISION [v1] References: 7.3	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? ***Yes, 16 bit only.*** Other: ***Since this profile only specifies a single value or option, this element although permitted, never needs to appear in a compliant metafile. See Table I of this profile.***	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? *8, 16, or 32.* Other: *None.*
T.13.2 REAL PRECISION [v1] Reference: 7.3	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter value? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *Any restrictions on the parameter value? (1, 16, 16) or (0, 9, 23).* Other: *None.*
T.13.3 INDEX PRECISION [v1] References: 7.3	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? ***Yes, 16 bit only.*** Other: ***Since this profile only specifies a single value or option, this element although permitted, never needs to appear in a compliant metafile. See Table I of this profile.***	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? 8, 16, or 32 Other: *None.*
T.13.4 COLOUR PRECISION [v1] References: 7.3	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? ***Yes, 8 bit only.*** Other: ***Since this profile only specifies a single value or option, this element although permitted, never needs to appear in a compliant metafile. See Table I of this profile.***	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? *8 or 16.* Other: *None.*

Table 13 - Metafile descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.13.5 COLOUR INDEX PRECISION [v1] Reference: 7.3	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? ***8*** Other: ***None.***	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter value? *8 or 16.* Other: *None.*
T.13.6 NAME PRECISION [v2] References: 7.3	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? Other: ***BPCGM01.00 supports version 1 only***.	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? *16 or 32.* Other: *None.*

Table 14 - Control elements

Functionality	Specifications - PPF	Specifications - Model Profile
T.14.1 VDC INTEGER PRECISION [V1] References 7.5	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? ***Yes, 16 bit only.*** Other:	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? 16 or 32. Other: *None.*
T.14.2 VDC REAL PRECISION [V1] References 7.5	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? Other: ***Not applicable, Integer VDC only.***	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? *(1, 16, 16) or (0, 9, 16).* Other: *None.*

Annex A

Informative Annex

A General Information. This section contains general or explanatory information that may be helpful.

A.1 CGM example Metafiles. The following examples illustrate complete BPCGM01.00 metafiles compatible with the CGM implementation BIIF.

A.1.1 Polygon example. The following example represents a white filled polygon with three vertices at (4,5), (6,7), and (8,9) relative to the VDC Extent origin.

Table II. Polygon example

CGM ELEMENT	HEX VALUES
BEGIN METAFILE ("POLYGON")	0x0028 0x0750 0x4F4C 0x5947 0x4F4E
METAFILE VERSION (1)	0x1022 0x0001
METAFILE DESCRIPTION ProfileId;BPCGM;ProfileEd:01.00/Source:Example;Date:20030424	0X105F 0X003C 0X3D50 0X726F 0X6669 0X6C65 0X4964 0X3B42 0X5043 0X474D 0X3850 0X726F 0X6669 0X6C65 0X4564 0X3A30 0X312E 0X3030 0X2F53 0X6F75 0X7263 0X653A 0X4578 0X616D 0X706C 0X653B 0X4461 0X7465 0X3A32 0X3030 0X3330 0X3432 0X3400

Table II. Polygon example

CGM ELEMENT	HEX VALUES
METAFILE ELEMENT LIST	0x1166 0x0001 0xFFFF 0x0001
BEGIN PICTURE ("POLYGON")	0x0068 0x0750 0x4F4C 0x5947 0x4F4E
COLOUR SELECTION MODES (DIRECT = 1)	0x2042 0x0001
EDGE WIDTH SPECIFICATION MODE	0X20A2 0X0000
VDC EXTENT	0x20C8 0x0000 0x7FFF 0x7FFF 0x0000
BEGIN PICTURE BODY	0x0080
FILL COLOUR (255,255,255)	0x52E3 0xFFFF 0xFF00
INTERIOR STYLE (SOLID=1)	0x52C2 0x0001
EDGE VISIBILITY (OFF)	0X53C2 0X0000
POLYGON (4,5 6,7 8,9)	0x40FF 0x000C 0x0004 0x0005 0x0006 0x0007 0x0008 0x0009
END PICTURE	0x00A0
END METAFILE	0x0040

A.1.1.1 Polygon Set example. The following example represents a polygon set which includes a red filled polygon and two smaller polygons that are transparent. The three polygons are relative to the VDC Extent origin.

Table III. Polygon Set example.

CGM ELEMENT	HEX VALUES
BEGIN METAFILE ("POLYGON SET")	0X002C 0X0B50 0X4F4C 0X5947 0X4F4E 0X2053 0X4554
METAFILE VERSION (1)	0X1022 0X0001

Table III. Polygon Set example.

CGM ELEMENT	HEX VALUES
METAFILE DESCRIPTION ProfileId;BPCGM;ProfileEd:01.00/Source:Example;Date:20030424	0X105F 0X003C 0X3D50 0X726F 0X6669 0X6C65 0X4964 0X3B42 0X5043 0X474D 0X3850 0X726F 0X6669 0X6C65 0X4564 0X3A30 0X312E 0X3030 0X2F53 0X6F75 0X7263 0X653A 0X4578 0X616D 0X706C 0X653B 0X4461 0X7465 0X3A32 0X3030 0X3330 0X3432 0X3400
METAFILE ELEMENT LIST	0X1166 0X0001 0XFFFF 0X0001
BEGIN PICTURE ("POLYGON SET")	0X006C 0X0B50 0X4F4C 0X5947 0X4F4E 0X2053 0X4554
COLOUR SELECTION MODES (DIRECT = 1)	0X2042 0X0001
EDGE WIDTH SPECIFICATION MODE	0X20A2 0X0000
VDC EXTENT	0X20C8 0X0000 0X7FFF 0X7FFF 0X0000
BEGIN PICTURE BODY	0X0080

Table III. Polygon Set example.

CGM ELEMENT	HEX VALUES
FILL COLOUR (RED)	0X52E3 0XFF00 0X0000
INTERIOR STYLE (SOLID=1)	0X52C2 0X0001
EDGE VISIBILITY (ON)	0X53C2 0X0001
EDGE WIDTH (7)	0X5382 0X0007
EDGE TYPE (DASHED)	0X5362 0X0002
EDGE COLOUR (BLUE)	0X53A3 0X0000 0XFF00
POLYGON SET 0,0 1000,0 1000,1000, 0,1000 250,250 350,250, 350,350, 250,350 550,550 650,550 650,650 550,650	0X411F 0X0048 0X0000 0X0000 0X0001 0X03E8 0X0000 0X0001 0X03E8 0X03E8 0X0001 0X0000 0X03E8 0X0002 0X00FA 0X00FA 0X0001 0X015E 0X00FA 0X0001 0X015E 0X015E 0X0001 0X00FA 0X015E 0X0002 0X0226 0X0226 0X0001 0X028A 0X0226 0X0001 0X028A 0X028A 0X0001 0X0226 0X028A 0X0002
END PICTURE	0X00A0
END METAFILE	0X0040

A.1.2 Text example. The following BPCGM example represents a label with text "test" with white characters 14 pixels high starting at location (10,20) relative to VDC Extent origin. The font list consists of two fonts (Helvetica and Courier). The text uses Courier.

TABLE IV. Text example.

CGM ELEMENT	HEX VALUES
BEGIN METAFILE ("TEXT")	0x0025 0x0454 0x4558 0x5400
METAFILE VERSION (1)	0x1022 0x0001
METAFILE DESCRIPTION ProfileId;BPCGM;ProfileEd:01.00/Source:Example;Date:20030424	0X105F 0X003C 0X3D50 0X726F 0X6669 0X6C65 0X4964 0X3B42 0X5043 0X474D 0X3850 0X726F 0X6669 0X6C65 0X4564 0X3A30 0X312E 0X3030 0X2F53 0X6F75 0X7263 0X653A 0X4578 0X616D 0X706C 0X653B 0X4461 0X7465 0X3A32 0X3030 0X3330 0X3432 0X3400
METAFILE ELEMENT LIST	0x1166 0x0001 0xFFFF 0x0001

TABLE IV. Text example.

CGM ELEMENT	HEX VALUES
FONT LIST ("Helvetica," "Courier")	0x11B2 0x0948 0x656C 0x7665 0x7469 0x6361 0x0743 0x6F75 0x7269 0x6572
BEGIN PICTURE ("TEXT")	0x0065 0x0454 0x4558 0x5400
COLOUR SELECTION MODES (DIRECT = 1)	0x2042 0x0001
VDC EXTENT	0x20C8 0x0000 0x7FFF 0x7FFF 0x0000
BEGIN PICTURE BODY	0x0080
TEXT COLOUR (255,255,255)	0x51C3 0xFFFF 0xFF00
CHARACTER HEIGHT (14)	0x51E2 0x000E
TEXT FONT INDEX (2=Courier)	0x5142 0x0002
CHARACTER ORIENTATION	0x5208 0x0000 0xFFFF 0x0001 0x0000
TEXT (10,20,1,4,"test")	0x408B 0x000A 0x0014 0x0001 0x0474 0x6573 0x7400
END PICTURE	0x00A0
END METAFILE	0x0040

A.1.3 Ellipse example. The following BPCGM example represents an empty ellipse with a four-pixel wide visible white edge, a center at location (10,20), with conjugate endpoints at locations (20,20) and (10,30) relative to VDC Extent origin.

Table V. Ellipse example.

CGM ELEMENT	HEX VALUES
BEGIN METAFILE ("ELLIPSE")	0x0028 0x0745 0x4C4C 0x4950 0x5345
METAFILE VERSION (1)	0x1022 0x0001
METAFILE DESCRIPTION ProfileId;BPCGM;ProfileEd:01.00/Source:Example;Date:20030424	0X105F 0X003C 0X3D50 0X726F 0X6669 0X6C65 0X4964 0X3B42 0X5043 0X474D 0X3850 0X726F 0X6669 0X6C65 0X4564 0X3A30 0X312E 0X3030 0X2F53 0X6F75 0X7263 0X653A 0X4578 0X616D 0X706C 0X653B 0X4461 0X7465 0X3A32 0X3030 0X3330 0X3432 0X3400
METAFILE ELEMENT LIST	0x1166 0x0001 0xFFFF 0x0001
BEGIN PICTURE ("ELLIPSE")	0x0068 0x0745 0x4C4C 0x4950 0x5345
COLOUR SELECTION MODES (DIRECT = 1)	0x2042 0x0001
EDGES WIDTH SPECIFICATION MODE (ABSOLUTE=0)	0x20A2 0x0000

Table V. Ellipse example.

CGM ELEMENT	HEX VALUES
VDC EXTENT	0x20C8 0x0000 0x7FFF 0x7FFF 0x0000
BEGIN PICTURE BODY	0x0080
EDGE COLOUR (255,255,255)	0x52A3 0xFFFF 0xFF00
EDGE VISIBILITY (on)	0x53C2 0x0001
EDGE WIDTH (4)	0x5382 0x0004
EDGE TYPE (1=solid)	0x5362 0x0001
INTERIOR STYLE (EMPTY)	0x52C2 0x0004
ELLIPSE (10,20 20,20 10,30)	0x422C 0x000A 0x0014 0x0014 0x0014 0x000A 0x001E
END PICTURE	0x00A0
END METAFILE	0x0040

A.1.4 Polyline example. The following BPCGM example represents a three-segment open RED polyline drawn with a six-pixel wide dashed line. The vertices are at (2,2), (4,6), (3,4), and (0,6) relative to VDC Extent origin.

Table VI. Polyline example.

CGM ELEMENT	HEX VALUES
BEGIN METAFILE ("POLYLINE")	0x0029 0x0850 0x4F4C 0x594C 0x494E 0x4500
METAFILE VERSION (1)	0x1022 0x0001
METAFILE DESCRIPTION ProfileId;BPCGM;ProfileEd:01.00/Source:Example;Date:20030424	0X105F 0X003C 0X3D50 0X726F 0X6669 0X6C65 0X4964 0X3B42 0X5043 0X474D 0X3850

Table VI. Polyline example.

CGM ELEMENT	HEX VALUES
	0X726F 0X6669 0X6C65 0X4564 0X3A30 0X312E 0X3030 0X2F53 0X6F75 0X7263 0X653A 0X4578 0X616D 0X706C 0X653B 0X4461 0X7465 0X3A32 0X3030 0X3330 0X3432 0X3400
METAFILE ELEMENT LIST	0x1166 0x0001 0xFFFF 0x0001
BEGIN PICTURE ("POLYLINE")	0x0069 0x0850 0x4F4C 0x594C 0x494E 0x4500
COLOUR SELECTION MODE (DIRECT = 1)	0x2042 0x0001
LINE WIDTH SPECIFICATION MODE (ABSOLUTE=0)	0x2062 0x0000
VDC EXTENT	0x20C8 0x0000 0x7FFF 0x7FFF 0x0000
BEGIN PICTURE BODY	0x0080
LINE COLOUR (255,0,0)	0x5083 0xFF00 0x0000
LINE TYPE (DASH=2)	0x5042 0x0002
LINE WIDTH (6)	0x5062 0x0006

Table VI. Polyline example.

CGM ELEMENT	HEX VALUES
POLYLINE (2,2 4,6 3,4 0,6)	0x403F 0x0010 0x0002 0x0002 0x0004 0x0006 0x0003 0x0004 0x0000 0x0006
END PICTURE	0x00A0
END METAFILE	0x0040

A.1.5 Elliptical Arc example. The following CGM example represents a blue elliptical arc that is four pixels wide. Figure 2 demonstrates pictorially the Elliptical Arc parameters and the relationship between conjugate diameter endpoints and start and stop vectors.

Table VII. Arc example.

CGM ELEMENT	HEX VALUES
BEGIN METAFILE ("ARC")	0x0024 0x0341 0x5243
METAFILE VERSION (1)	0x1022 0x0001
METAFILE DESCRIPTION ProfileId;BPCGM;ProfileEd:01.00/Source:Example;Date:20030424	0X105F 0X003C 0X3D50 0X726F 0X6669 0X6C65 0X4964 0X3B42 0X5043 0X474D 0X3850 0X726F 0X6669 0X6C65 0X4564 0X3A30 0X312E 0X3030 0X2F53 0X6F75 0X7263 0X653A 0X4578 0X616D 0X706C 0X653B 0X4461 0X7465

Table VII. Arc example.

CGM ELEMENT	HEX VALUES
	0X3A32 0X3030 0X3330 0X3432 0X3400
METAFILE ELEMENT LIST	0x1166 0x0001 0xFFFF 0x0001
BEGIN PICTURE ("ARC")	0x0068 0x0341 0x5243
COLOUR SELECTION MODES (DIRECT = 1)	0x2042 0x0001
LINE WIDTH SPECIFICATION MODE (ABSOLUTE=0)	0x2062 0x0000
VDC EXTENT	0x20C8 0x0000 0x7FFF 0x7FFF 0x0000
BEGIN PICTURE BODY	0x0080
LINE WIDTH (4)	0x5062 0x0006
LINE COLOUR (0,0,255)	0x5083 0x0000 0xFF00
LINE TYPE (1=solid)	0x5042 0x0001
ELLIPTICAL ARC (10,10 10,5 20,10, 15,5 5,5)	0x4254 0x0014 0x000A 0x000A 0x000A 0x0005 0x0014 0x000A 0x000F 0x0005 0x0005 0x0005
END PICTURE	0x00A0
END METAFILE	0x0040

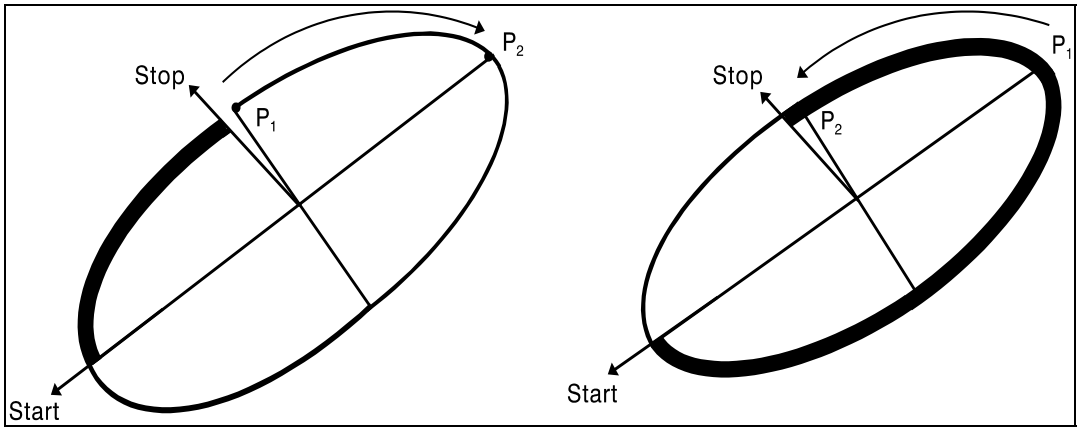

Figure 2. Elliptical Arc orientation.

A.1.6 Elliptical Arc Closed example. The following CGM example represents an elliptical arc close that is red and filled with pie closure.

Table VIII. Arc Closed example.

CGM ELEMENT	HEX VALUES
BEGIN METAFILE ("ARCCLOSE")	0x0024 0x0841 0x5243 0x434C 0x4F53 0x4500
METAFILE VERSION (1)	0x1022 0x0001
METAFILE DESCRIPTION ProfileId;BPCGM;ProfileEd:01.00/Source:Example;Date:20030424	0X105F 0X003C 0X3D50 0X726F 0X6669 0X6C65 0X4964 0X3B42 0X5043 0X474D 0X3850 0X726F 0X6669 0X6C65 0X4564 0X3A30 0X312E 0X3030 0X2F53 0X6F75 0X7263 0X653A 0X4578 0X616D 0X706C 0X653B 0X4461

Table VIII. Arc Closed example.

CGM ELEMENT	HEX VALUES
	0X7465 0X3A32 0X3030 0X3330 0X3432 0X3400
METAFILE ELEMENT LIST	0x1166 0x0001 0xFFFF 0x0001
BEGIN PICTURE ("ARC")	0x0068 0x0841 0x5243 0x434C 0x4F53 0x4500
COLOUR SELECTION MODE (DIRECT = 1)	0x2042 0x0001
EDGE WIDTH SPECIFICATION MODE	0X20A2 0X0000
VDC EXTENT	0x20C8 0x0000 0x7FFF 0x7FFF 0x0000
BEGIN PICTURE BODY	0x0080
INTERIOR STYLE	0x5062 0x0006
FILL COLOUR (255,0,0)	0x5083 0x0000 0xFF00
EDGE VISIBILITY (on)	0x53C2 0x0001
ELLIPTICAL ARC CLOSE (10,10 10,5 20,10, 15,5 5,5)	0x4276 0x000A 0x000A 0x000A 0x0005 0x0014 0x000A 0x000F 0x0005 0x0005 0x0005 0x0000
END PICTURE	0x00A0
END METAFILE	0x0040

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